PUBLIC LIBRARY
DETROIT

MODERN PLASTICS

MARCH 1949

R v.26² Mar.-Aug. 1949

It pays to use your custom molder's know-how

Say Sunbeam Corporation's Engineers

No. 3 in a series on Plastics Skill at Work...

PROJECT:
Handles for Restyled Electric Coffeemaster

CUSTOMER:
Sunbeam Corporation
Chicago, Illinois

MOLDER:
Chicago Molded Products Corporation

MATERIAL:
General-Purpose Durez Phenolic Plastic

THE PLAN: With customer's requirements in hand, engineers at Chicago Molded Products Corporation confer on details of plastic handles for the new Sunbeam Coffeemaster.

THE RESULT: Upper handles for Coffeemaster being removed from multi-cavity plunger mold in double-ram press, one of a battery constructed to this molder's specifications.

Design ideas are not the only kind an experienced custom molder can bring to your product plans. His suggestions often give rise to longer product service life, or to lower parts cost.

A case in point is the redesigned Sunbeam Coffeemaster, with plastic handles custom molded of Durez by the Chicago Molded Products Corporation. With a restyled product coming up, Chicago Molded engineers seized the opportunity to offer their client the benefits of an advanced molding method. Realizing that double-ram plunger molding would offer several advantages, they adopted this method with results as follows:

The product was better two ways, first in appearance, because less finishing is necessary with the new method, and second in durability, since density was improved in the molded parts. Furthermore, reduced finishing operations naturally lowered the final cost.

The quality of Durez phenolic plastics is matched by the experience of our field technicians, who will gladly meet with you and your molder on any plastics problem. You are welcome to call on them freely.

A new hit with plastics users everywhere is the handy "Durez Check-Chart." Write for yours. Durez Plastics & Chemicals, Inc., 123 Walck Rd., N. Tonawanda, N. Y.

DUREZ

PHENOLIC RESINS

- MOLDING COMPOUNDS
- INDUSTRIAL RESINS
- PROTECTIVE COATING RESINS

PHENOLIC PLASTICS THAT FIT THE JOB

Tech.

WHEN *Catalin* TAKES A HAND...THE GAME'S MORE ENJOYABLE

Name almost any type of table game . . . Let's begin with Backgammon. What could be finer than men and dice of rich contrasting Catalin in colors! Now, play Chess. Serious pleasure, and again the noble characters of exquisitely carved, pleasing-to-the-touch Catalin know no peers!

Next, Poker, for which flawlessly finished Catalin, in hues that range from "cents to dollars" magically sliced from stock rods, makes up into handsome chip sets. Chip racks, too, cast of Catalin, are incomparably exquisite.

Now include Mah Jong . . . what player ever fails to comment admiringly of Catalin racks and counters—they're as much the game as the colorful symbols engraved on the Catalin playing tiles sliced from oblong rods.

Let's not forget Checkers, Dominoes, Cribbage, Roulette and many other adult games. All, when Catalin is made a party to the play, become more enjoyable—ever interesting. There's something distinctively custom about Catalin.

Catalin, the gem-like cast-phenolic, so beautiful unto itself, is certain to enhance the sales and decorative appeal of any product to which it serves as a whole or part. Its speedier availability, too, without recourse to expensive tooling, accords it preference among manufacturers.

Catalin's advantages and economies are many; so many that the members of our service staff would enjoy assisting you personally in planning your proper and most profitable use of *the gem of plastics*. Inquiries invited!

CATALIN CORPORATION OF AMERICA

ONE PARK AVENUE • NEW YORK 16, N. Y.

CAST PLASTICS • LIQUID RESINS • MOLDING COMPOUNDS

MODERN PLASTICS*

VOLUME 26 MARCH 1949 NUMBER 7

CONTENTS

GENERAL

More Production = Increased Competition (Editorial) 5

Plasticizers 55
A comprehensive discussion of the importance of these materials and their blends, with specific emphasis on their use in vinyls

Piscatorial Plastics 61
Millions of fishermen use equipment in which plastics play a large and constantly increasing part

Polystyrene Minnow Trap 66
A sturdy folding unit in which even the hinges, hinge pins, and latch are plastic

Dispenser Redesign 68
How the number of parts in a salt tablet dispenser were reduced from 29 to 9; phenolic replaces metal

Packaging Machinery Uses Plastics 69
Phenolic laminate, acrylic, and saran lend special properties to special applications

Thermometers Housed in Plastic 72
by Alfred F. Fukal
Low-cost instrument redesigned with magnifying one-piece molded front

Biplastics Strip in Hygrometer 73
Combination, unaffected by temperature changes, reacts efficiently to humidity variations

Sound and Action in Pull Toy 74
Ethyl cellulose and polystyrene are used for various parts, including gears and wheels

Technical Session on Reinforced Plastics 75
Summaries of papers presented at the S.P.I. Reinforced Plastics Div. meeting in Chicago

Plastics Products 76
New and different merchandise which bases its appeal on plastics

The Vinyl Film Market 122
by Ralph F. Hansen
Market surveys indicate that the vinyl films can expand greatly through the development of new uses

Plastic-Top Eyeglass Frames 136

Light Control Switches 141

Blind-Hole Locking Inserts 142

Polyethylene pipe and fittings 144

Polystyrene Ruler 146

Nursery Toys 148

PLASTICS ENGINEERING

Trouble-Shooting Molding Problems 81
by Frank J. Donohue

TECHNICAL

Adhesives for Phenol-Formaldehyde Laminates 95
by Lucius Gilman and Stanley J. Lowell

DEPARTMENTS

Plastics Digest 102

U. S. Plastics Patents 106

Books and Booklets 110

New Machinery and Equipment 114

Plastics Stock Molds 118

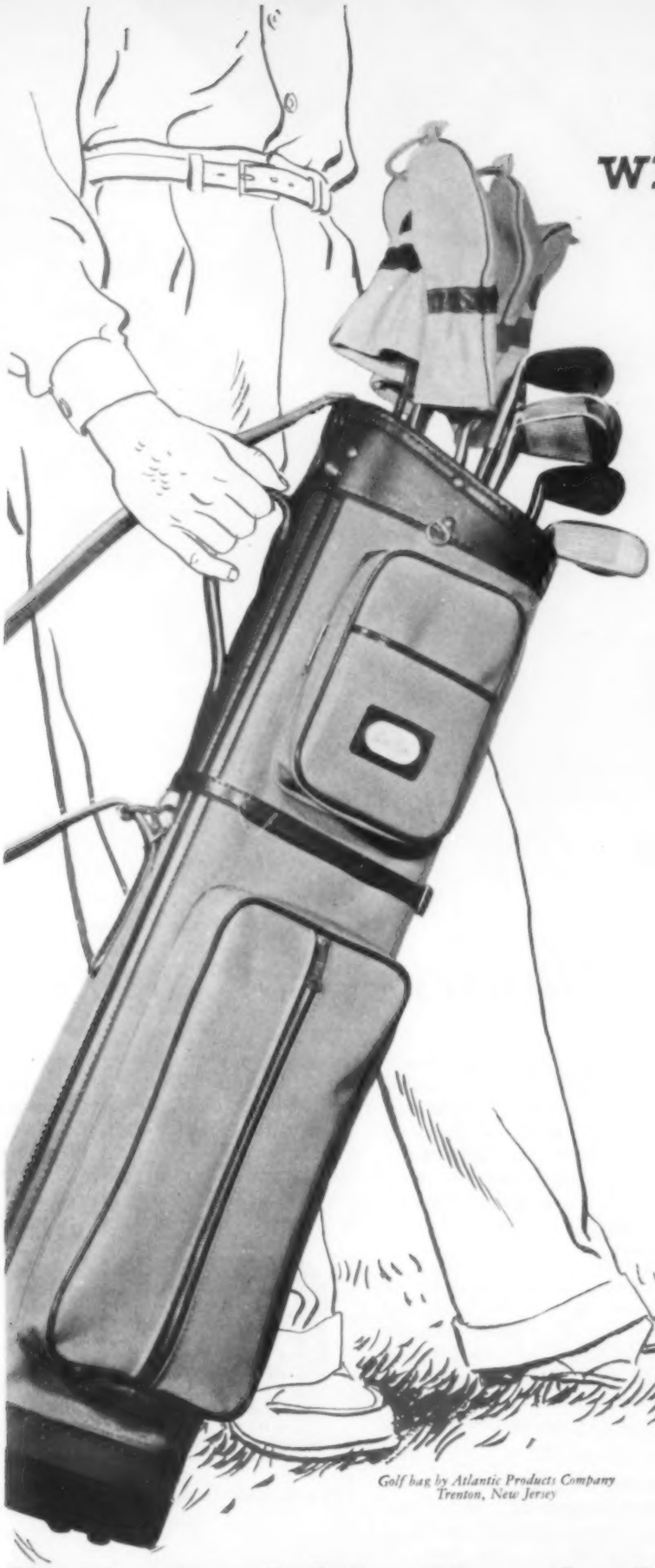
The Plastiscope 158
News of the Industry; Predictions and Interpretations; Company News; Personal; Meetings

PUBLICATION OFFICE: Orange, Conn. Executive and Editorial Office: 122 E. 42nd St., New York 17, N. Y. Published each month by Modern Plastics, Inc. Entered as second class matter, at the Post Office at Orange, Conn. under the act of March 3, 1879.

Copyright 1949 by Modern Plastics, Inc. All rights reserved.

Subscription $5.00 a year, $8.00 for two years in the U. S., its possessions and South America. Canadian subscriptions $5.50 a year, $9.00 for two years. All other countries $6.00 a year, $10.00 for two years, payable in U. S. currency. Price of this issue 75¢ per copy.

*Reg. U. S. Patent Office.



Golf bag by Atlantic Products Company
Trenton, New Jersey

A new idea with a *trim look*

. . . another example of what GEON polyvinyl resins can do

IF this is the trimmest-looking golf bag you've seen in a caddy's age, then please look a little more closely at the trim itself.

The material is made from Geon polyvinyl resins. Both the material maker and the golf bag maker can look forward to a market in which customers will be delighted with the fact that for all its smartness, the golf bag is lighter, sturdier and sure of a longer life.

The characteristics of Geon needed — and delivered — are its resistance to scuffing, wear, mildew and grease. It can be cleaned with a damp cloth—neither sun nor rain will harm it—resists both scratching and abrasion.

Yet the protective trim on golf bags is only one of the many problems Geon has helped solve in recent years. Materials developed from it produce fire-resistant draperies, tough taxi-seat coverings, protective containers for fresh foods, collars that won't wilt, women's shoes of fetching colors. Does this give you ideas?

Geon can be molded, extruded, used as a calendering, coating, an impregnant, or cast into sheets. We make no finished products from Geon, but we are glad to supply additional information and to help in any special problems. Write B. F. Goodrich Chemical Company, Dept. N-3, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

Visit our Booths 310-A & B at the 18th National Packaging Exhibition.

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

Chicago Molded Plastics — of course!

This 12½ pound valve seat plays an important role in protecting America's oil supply. It's a vital part of the "Floating Action" equipment manufactured by the Halliburton Oil Well Cementing Company of Duncan, Oklahoma. The key to this "Floating Action" is the Float Shoe . . . a molded plastic nose with ball valve, for which this is the seat. For a molded plastics piece, it's exceptionally large . . . 10¾ inches in diameter and 3 inches thick. Subject to terrific punishment . . . tested under pressures equal to the collapsing point of the steel casing itself . . . yet easily drilled out when the casing is set . . . it demonstrates the importance of Chicago Molded Plastics in industry.

There's nothing delicate about the Halliburton Valve Seat. We mold it in several sizes from 5½ inches to 10¾ inches in diameter, and in massive sections up to 3 inches. Because of the extremely tough job it has to do, a canvas-filled, high impact thermosetting material is used. The pre-formed material is electronically pre-heated to a point close to actual molding temperature. Thus, even though the sections are unusually thick, the parts have adequate cure, excellent density, and the highest possible strength characteristics.

This is not a new job with us. We've been molding these valve seats for many years. But it's a good example of the importance of selecting a molder who has the knowledge, experience, and facilities to handle any plastics job right, no matter what is required.

You'll find that Chicago Molded qualifies in every respect . . . one of the largest and finest plastic molding plants in America . . . 30 years of service to industry . . . a national reputation for quality and engineering skill. And behind it all is a spirit of friendly co-operation which makes Chicago Molded the kind of supplier you'll like to work with. Why not discuss your next molding job with a Chicago Molded engineer? Write or phone. There's no obligation.

CHICAGO MOLDED PRODUCTS CORPORATION

1046 N. Kolmar Ave., Chicago 51, Ill.

COMPRESSION, INJECTION AND PLUNGER MOLDING OF ALL PLASTIC MATERIALS

EDITORIAL STAFF

Editor-in-Chief: CHARLES A. BRESKIN
Editor: HIRAM MCCANN
Technical Editor: DR. GORDON M. KLINE
Engineering Editor: FRED B. STANLEY
Senior Editor: R. L. VAN BOSKIRK
Managing Editor: A. PAUL PECK
Art Director: DONALD R. RUTHER
Midwestern Editor: VAL WRIGHT
Associate Editor: VIRGINIA SUE WILSON
Associate Editor: WARREN H. GOODMAN
Assistant Editor: THEODORE B. BRESKIN
Assistant Editor: LINDA T. LEFLER
Readers Service: EMMA TURAK

BUSINESS STAFF

Publisher: CHARLES A. BRESKIN
General Manager: ALAN S. COLE

P. H. Backstrom — A. M. Rothenberg
M. A. Olsen — B. W. Gussow
J. M. Connors — J. A. Drucker
R. C. Beggs — W. F. Kennedy
S. S. Siegel

Promotion Manager: PHILIP W. MULLER
Production Manager: DANIEL M. BROADS
Asst. Production Manager: B. J. FARINA

Executive and Editorial Offices:
122 E. 42nd St., New York 17, N. Y.
Tel., MUrray Hill 3-0655

Circulation Department
Circulation Manager: FREDERICK A. KLEIN
32 Broadway, New York 4, N. Y.
Tel., WHitehall 4-4782

Branch Offices

Chicago 1: 221 N. La Salle St.
Manager: J. M. Connors
Tel., Financial 6-3450

Cleveland 14: 815 Superior Ave.
Manager: R. C. Beggs
Tel., Superior 0737

Los Angeles 5: 2412 W. 7th St.
Tel., Fairfax 6254

San Francisco 5: 1085 Monadnock Bldg.
Tel., Douglas 2-4475
Manager: A. M. Rothenberg

London, England: Transatlantic Publicity, Ltd., 20/21 Broad Street Ave., Bromfield St., London E.C. 2.
Manager: L. H. Dolaro

MODERN PLASTICS is fully protected by copyright and nothing that appears in it may be reprinted wholly or in part, without special permission.

Member Audit Bureau of Circulation
MODERN PLASTICS is regularly indexed in Industrial Arts Index and Industex.

EDITORIAL

More Production = Increased Competition

An amazing evolution has taken place in the plastics molding industry in the last eight years. Plastics industrialists are conscious of this changing trend, but there has been little discussion on the subject in print.

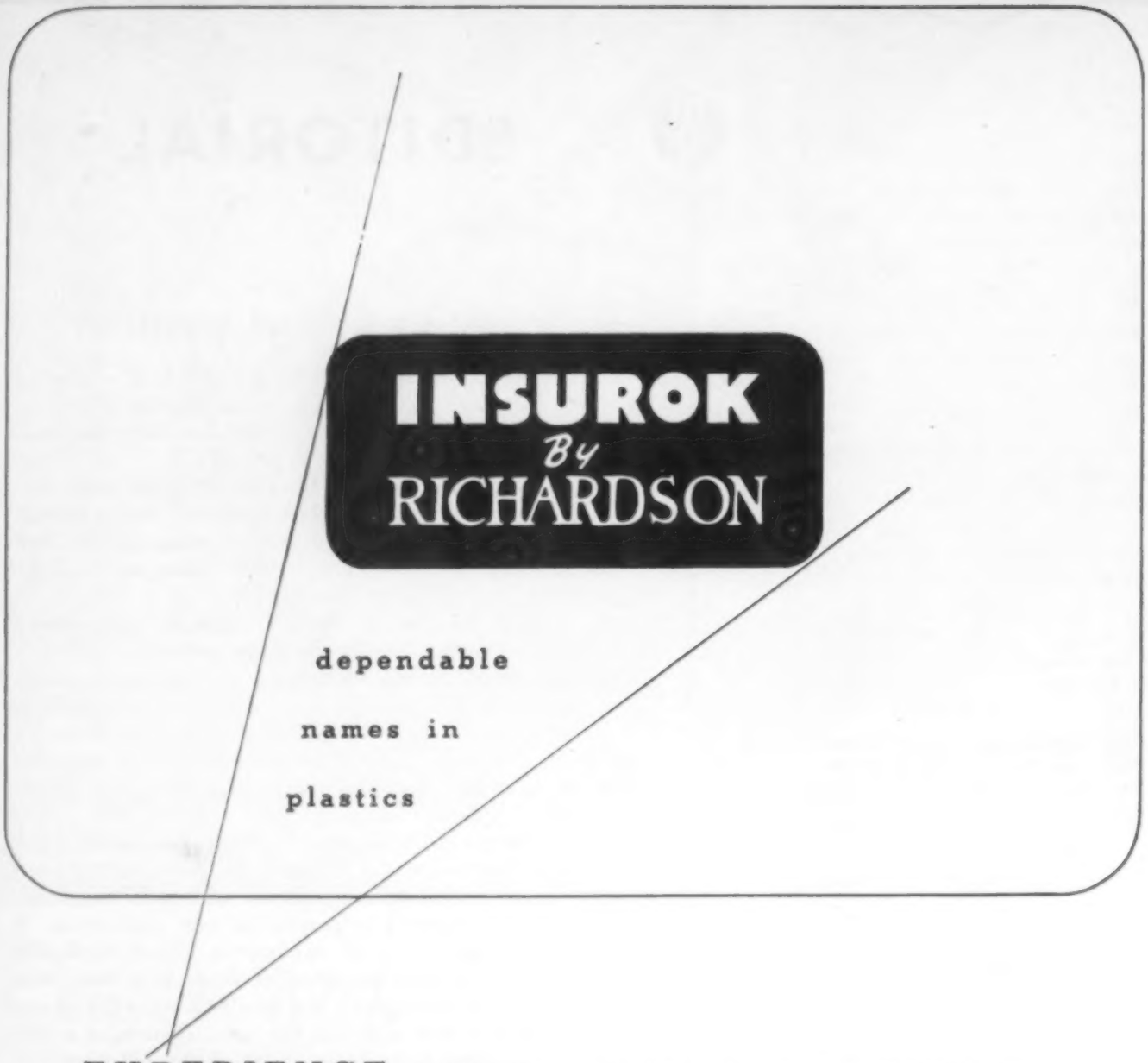
Statistics indicate that the thermoplastics are now consuming more molding powder than the thermosetting branch of the industry. Consumption of thermoplastics in 1948 amounted to over 50% of all plastics molding materials in comparison to 15% of the total in 1940.

We have no intention of trying to chart the future trend of this development. But of one thing we can be certain—the competition between plastics for old and new markets is going to make interesting news. Added to the competition from other materials and the further depressing factor of currently filled pipelines, it becomes ever more apparent that selling is the most important problem facing this industry.

Many plastics goods salesmen have been in clover for a long time. The business of learning about competition from other plastics and other materials has been sadly neglected. The ingenuity required to search for new applications in other fields—the crave to explore—is almost negligible among run-of-the-mine salesmen or those who have been softened by "easy pickings". We wouldn't go so far as one business leader who said that the industry needed a new corps of salesmen because so many of the old ones had acquired the bad habits of the days when customers were "begging rather than buying"; but there is certainly reason to believe that many of them need schooling in a new approach to the sales angle.

Furthermore, it isn't only the salesman who needs a pep talk. High company officials, too, have been lulled into false dreams of a never ending market. Some of them have been so secretive about their product that it was astonishing to find anyone who knew where to buy it. Much of their promotion, literature, and advertising has been skimpy, sometimes uninformative, often mysterious as to the true properties of their product. There have been several exceptionally fine sales campaigns, but their scope has been limited. There haven't been enough.

There have been any number of gratifying new applications, but total poundage is still low when compared to other important industries. Intense competition between thermoplastics and thermosets will increase the market for both, for each will be forced to look for new outlets, but neither will profit unless they cry their wares from the housetops. The customer must be told what he can expect from plastics.



EXPERIENCE is just one of the factors that make the names of INSUROK and Richardson more significant to manufacturers whose products require laminated or molded plastics. Richardson customers benefit from this experience in many ways.

(1) Richardson experience with a wide variety of plastic materials helps you select the one that accomplishes your purpose most effectively, efficiently and economically.

(2) Richardson experience in the design and production of Laminated INSUROK and Molded INSUROK products has resulted in savings to scores of manufacturers.

(3) Richardson's many proven grades of Laminated INSUROK are available in sheet, rod or tube stock or in fabricated, punched or post-formed component parts for an endless variety of applications.

(4) INSUROK plastic products and Richardson services have played an important part in the development and refinement of many products.

It might be to our mutual advantage to know how these materials and services can work for you.

INSUROK is a registered trade-mark of The Richardson Company

The RICHARDSON COMPANY

GENERAL OFFICES: LOCKLAND, OHIO FOUNDED IN 1858

Sales Headquarters: MELROSE PARK, ILLINOIS

CLEVELAND · DETROIT · INDIANAPOLIS · MILWAUKEE · NEW BRUNSWICK, (N. J.) · NEW YORK · PHILADELPHIA · ROCHESTER · ST. LOUIS

Another product of Du Pont research—a new, better heat-resistant "LUCITE" acrylic resin molding powder with improved features for molder and consumer.*

New "Lucite" HM-140 gives you these improved features:

INCREASED HEAT-STABILITY

This new Du Pont product is much more heat-stable than well-known "Lucite" HM-122. For thin or intricate sections, *higher* temperatures can be used to obtain the greatest degree of fluidity possible—without chemical breakdown. Pieces can be molded more accurately with a considerable reduction in rejects.

IMPROVED FLOW PROPERTIES

"Lucite" HM-140 is more fluid at a given molding temperature than was "Lucite" HM-122. This offers a major improvement in that new "Lucite" HM-140 can be molded into thick sections at *lower* temperatures. And since these lower temperatures can now be used, "Lucite" HM-140 will harden more rapidly on cooling. As a result, the molding cycle is considerably shortened, and there is a corresponding reduction in the shrinkage of the molded piece.

BETTER COLOR

In its familiar crystal-clear form, the new composition is even more water-white than "Lucite" HM-122. Its color is more stable at higher molding temperatures and on exposure to weathering. Now you can obtain a product even more brilliant and lustrous than was possible with previous acrylic molding powders.

DU PONT
REG. U.S. PAT. OFF.
Plastics
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

OTHER PROPERTIES remain essentially the same as those of "Lucite" HM-122. The heat-distortion temperature of "Lucite" HM-140, 208°F. by A.S.T.M. test, indicates its use wherever heat-resistance is important in an acrylic article. And it costs no more than general-purpose acrylics. Like other "Lucite" powders, HM-140 is manufactured in a wide range of transparent, translucent, and opaque colors. In weather-resistance, "Lucite" is unsurpassed by any transparent plastic. It holds its beauty for years. It is light in weight and shatter-resistant. And transparent "Lucite" transmits up to 92% of light, can be "edge-lighted," and will "pipe" light around curves.

★ ★ ★

WRITE FOR FURTHER INFORMATION on "Lucite" HM-140 and other Du Pont plastics. No obligation. If you wish, Du Pont technical men will be glad to assist you in adapting Du Pont plastics to your requirements. Address E. I. du Pont de Nemours & Co. (Inc.), Plastics Dept., Room 363, Arlington, N. J.

*Reg. U. S. Pat. Off.

INCREASE MOLDING PRODUCTION ... with this Machine!

For fast, efficient molding within its range . . . the Reed-Prentice 5A-4 Oz. plastic injection machine is the logical choice of the production minded molder.

The 6 cavity comb shot shown above illustrates complete flow of the material (polystyrene) to the extreme 15 inch length of the mold. Uniform formation and smoothness of individual teeth indicates the perfect temperature, timing and pressure control possible with the 5A-4 Oz. machine.

This popular model has many of the operating and construction features of the larger Reed-Prentice injection machines. Versatile, precision performance and ease of maintenance are provided for an extremely low initial investment.

The 5A-4 Oz. injection machine is available for immediate delivery. For information about the entire Reed-Prentice line (4, 8, 10, 12, 16, 24 and 32 Oz. models) — write Dept. D.

• SPECIFICATIONS •

Die locking pressure, tons	100
Max. casting area, sq. in.	50
Mold opens	8"
Max. die space	12"
Size: die plates	16 x 21"
Pressure psi on material	16,000

THE WORLD'S LARGEST MANUFACTURERS OF INJECTION MOLDING MACHINES

NEW YORK 6
75 West Street

LOS ANGELES 11
2314 Santa Fe Ave.

INJECTION
REED-PRENTICE CORP.
WORCESTER MACHINES MASS., U.S.A.

CLEVELAND 13
1213 W. 3rd Street

Recipe for a Better Product

BECAUSE the housing of this portable kitchen mixer is injection molded of *cellulose acetate*, the finished product gains these thermoplastic advantages:

shatterproof toughness
clear-through color
surface permanence
touch comfort

and production gains these:

high speed moldability
machinability
no painting or finishing

BECAUSE the cellulose acetate is LUMARITH* XF —Celanese special heat and flame resistant molding material—the finished product gains this approval stamp:

BECAUSE the producers of LUMARITH XF can cite many successful product applications of this type, you owe it to yourself and to your product to look into LUMARITH XF. Celanese Corporation of America, Plastics Division, Dept. D-1, 180 Madison Avenue, New York 16, N. Y.

LUMARITH* XF

A Celanese* PLASTIC

*Reg. U. S. Pat. Off

Osterett Two-beater Hand Mixer, manufactured by John Oster Mfg. Co., Racine. Housing molded by Norco Plastic Co., Milwaukee.

FOR *Beauty* AND *Economy*

YOUR BEST BET IS GRIGOLEIT

Stock Pulls, Knobs and Pendants

Versatile molded plastic products like these by Grigoleit offer the product designer an attractive combination of modern styling and economical price. Here are but a few of the many stock pulls, knobs and pendants styled for sales . . . ready for immediate shipment. As always—your best bet is Grigoleit!

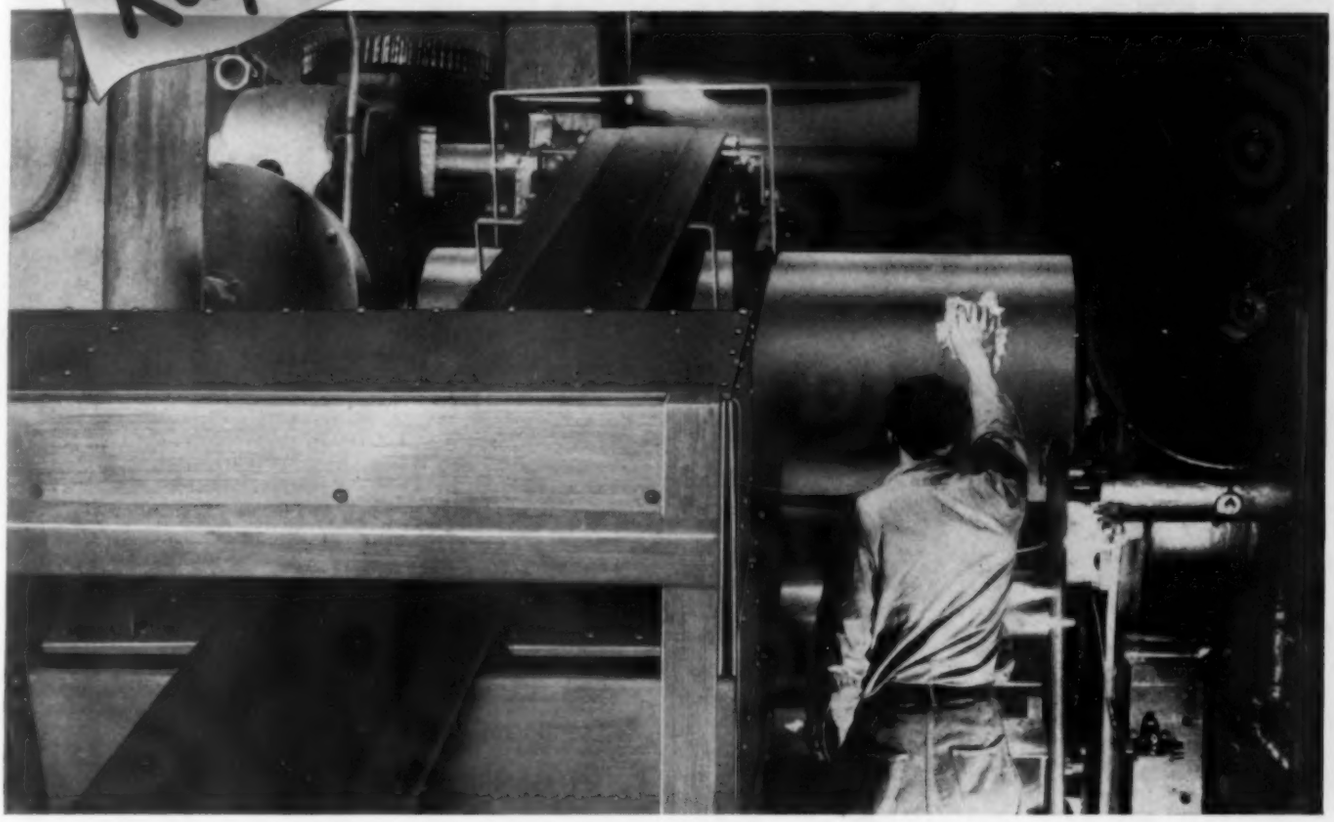
Consult Grigoleit today for stock or custom-molded plastic items. Write for colorful, fully-illustrated catalog.

THE GRIGOLEIT COMPANY

"Over Twenty Years in Plastics"

744 E NORTH ST. DECATUR, ILLINOIS

Tramp Metal Can't Reach Respro's 4-Roll Plastic Calender



ELECTRONIC DETECTOR SCANS *RESPROID*, SIGNALS AND STOPS METAL-CONTAMINATION

RESPROID is a new, versatile plastic manufactured by Respro Inc., Cranston, Rhode Island. It's a hot plastic mass when it reaches the calender, ready to be sheeted to proper gauge and width . . . and it must be metal-free! If hidden particles . . . nails, screws, staples, etc., were to pass through the rolls, resulting damage could be serious enough to cause a complete production shutdown.

The Allis-Chalmers Metal Detector *protects* the calender rolls from such damage by automatically stopping the conveyor when stray metal is detected. The contaminated piece is rejected, and the metal-free plastic strip moves on toward the calender.

The plastics industry is just one of many enjoying the benefits of electronic metal detection. Manufacturers of food, tobacco, chewing gum, candy, rubber . . . also use it to advantage. Allis-Chalmers Metal Detectors spot magnetic or non-magnetic particles as small as .039 in. in diameter. For help with your application, call your nearby A-C office, or write direct.

ALLIS-CHALMERS

ELECTRONIC HEATERS AND METAL DETECTORS FOR INDUSTRY

• *The Metal Detector was developed by RCA Victor. Now, however, RCA's high frequency heating and metal detection equipment has been added to the Allis-Chalmers line. Thus, the combined electronic experience of two great companies is available to serve industry.*

ALLIS-CHALMERS, 1163A SO. 70 ST.
MILWAUKEE, WIS. A 2582

Please send me more information on:

☐ METAL DETECTORS
Protect product quality and machinery. 2, 4, 7, 12 in. apertures.

☐ INDUCTION HEATERS
Brazing, soldering, hardening, annealing. 1 through 200 kw.

☐ DIELECTRIC HEATERS
Wood, plastics, textiles, sand cores. 100 w through 125 kw.

Name.....

Company.....

Address.....

City.....State.....

NOW *You're* TELLING US

TWENTY years ago, a plastics man knew all there was to know about plastics. There wasn't much to know. There were a few obscure plastics around, and a few unspectacular things you could do to 'em. The man on the street usually thought plastics was some kind of surgery.

Today, things are different. The man on the street lives with plastics, eats with 'em, plays games with 'em. And the plastics man knows *all* about just one little corner of a hell of a big industry. It's got *real* big. So, if you want a molded part, you don't just go to any plastics man, you go to a custom-molder. He knows all about the 15% of plastics production that goes into molded products.

We are custom-molders—so all this is beginning to sound like logic to us. We can introduce you to the 16 moldable plastics and the 4 different ways we mold them. We can tell you the right ones for the parts or products you have in mind.

Between us, we should get it done right.

Boonton

THE BOONTON MOLDING COMPANY

Boonton 3, N. J. Boonton 8-2020

Est. 1921

MOLDERS OF MOST PLASTICS BY MOST METHODS

With Big H-P-M *Semi-Automatics* --Jobs Like These Are a Cinch!

When the Plastics Division of Continental Can Company decided to go after "big" molding jobs, they chose a 750-ton H-P-M semi-automatic compression press. Here's why... H-P-Ms require a minimum of floor space. No accumulators or connecting hydraulic pipe lines are needed... just fill the tank with oil and connect the motor to your power line and it's ready to go to work! The compact, heavy duty H-P-M radial pump supplies **steady pressure** which can be easily and quickly adjusted. Automatic ejectors eliminate time consuming manual effort. These are just a few of the many money saving features of high speed H-P-M presses.

You, too, can step-up production and eliminate costly rejects with modern H-P-Ms. Call in a nearby H-P-M engineer today!

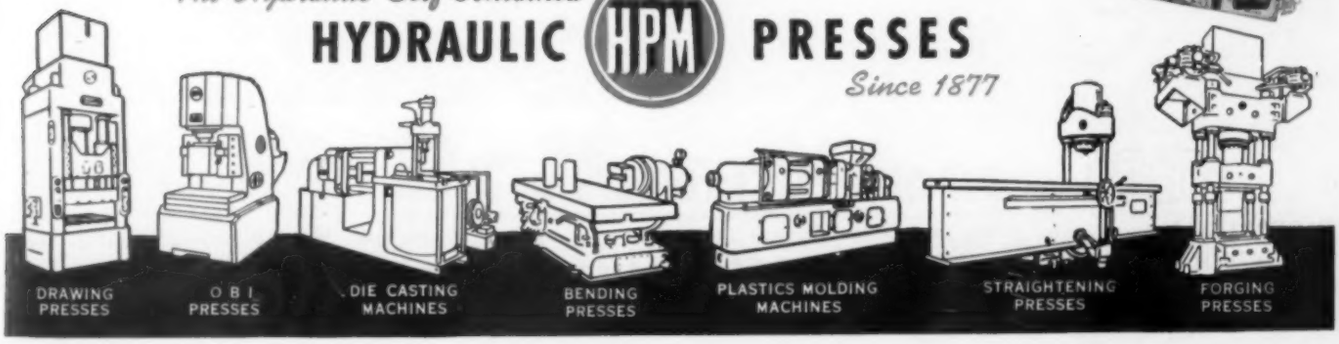
THE HYDRAULIC PRESS MANUFACTURING CO.
1010 Marion Road • Mount Gilead, Ohio, U.S.A.

Write for a free copy of Bulletin 4802 describing H-P-M compression and plunger type transfer molding presses. Stock sizes are available for quick delivery.

All-Hydraulic Self-Contained

HYDRAULIC HPM PRESSES

Since 1877



THE PENALTY OF LEADERSHIP

So many people know you

For that "man of the house" who loves to play host . . . TUPPERWARE conventional pieces and TUPPERWARE special items warm his heart.

So long as one is unknown it is possible to come and go, hither and yon, without attracting even a flutter of attention or disturbing the self-centered thinking of the multitude — all fiercely intent on their own little worlds.

But once one has done something outstanding . . . has stepped out from the herd . . . has taken on a mantle of Leadership, all that is changed.

So many people know you.

The things one does become known to so many . . . the things one makes, are bought without question or thought of being other than conforming to clear cut standards.

So many people know the name Tupper . . . housewives in big cities and little country towns . . . the Colonel's Lady and Judy O'Grady . . . the Colonel himself and G I Joe. All of them know the name of Tupper for its works.

The name of Tupper is probably known to more people as designers and molders of those award-winning, charming table and kitchen wares — fashioned from that intriguing "material of the future", Poly-T, the Tupper trade-marked name for application of Polyethylene, than is any other.

So when a package, a container, commercial or industrial application is a Tupper product, selected from stock items or custom molded to special requirements, we may both be assured we are in good company — so many people know us.

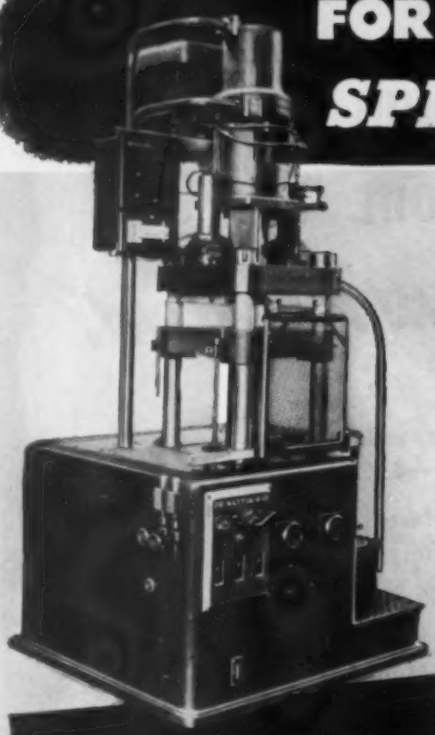
TUPPER TUPPER CORPORATION TUPPER!

FACTORIES: Farnumsville, Mass., and Cuero, Texas **New York Show Rooms 225 Fifth Ave.**

ADDRESS ALL COMMUNICATIONS TO: Development Department D, CUERO, TEXAS

COPYRIGHT TUPPER CORPORATION 1949

FOR IMPROVED PRODUCTION
SPECIFY DE MATTIA

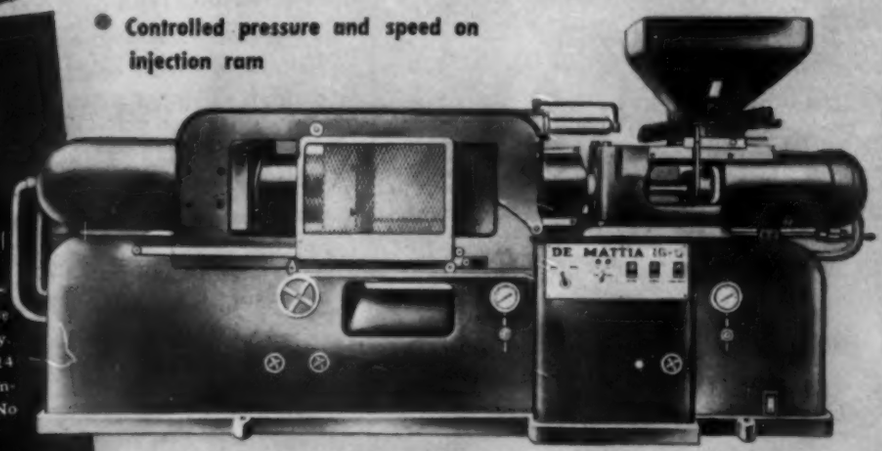


DE MATTIA INJECTION MOLDING PRESSES OFFER THESE IMPORTANT FEATURES—

- **Solid steel frames for maximum strength and rigidity**
- **Straight hydraulic clamp pressure of over 400 tons employing a standard 1000 PSI hydraulic system**
- **Hardened and ground platen guides with gibs to take up for wear without dismantling**
- **Push button control for forward and reverse motion of injection ram**
- **Controlled snubber action on both movements of closing platen helps protect mold faces and also adjusts speed of ejector movement**
- **Mold opening can be set to minimum required for fast molding cycles**
- **Controlled pressure and speed on injection ram**

HYDRAULIC VERTICAL PRESSES— Recommended for general molding production and highly efficient on metal insert work. Available in 4 ounce or 12 ounce capacity. Illustrated literature, including specifications, sent on request.

ALL HYDRAULIC HORIZONTAL PRESSES— These ruggedly built presses feature every advantage known to the industry. Models are available with 6, 12 or 24 ounce capacity. Write for complete engineering data and specifications. No obligation.



HANDLE SCRAP QUICKLY, EFFICIENTLY WITH HIGH CAPACITY GRANULATORS

For LARGE SLUGS AND CHUNKS. The DeMATTIA CHUNK CUTTER provides low cost salvage of molded pieces too tough for ordinary scrap grinders. Capacity over 150 lbs. per hour.

FOR GRANULATING of vinylite, Gears and all hard thermoplastics. Handles 200 lbs. per hour. Can be hand wiped in 3 minutes for color change.

Complete service on *MOLD MAKING*

Our mold department is equipped to handle your mold requirements, large or small, from start to finish including design and engineering service. Inquiries on mold making will receive prompt, courteous attention.

DE MATTIA MACHINE and TOOL CO.

DE MATTIA MACHINE and TOOL CO.

CLIFTON, N. J. • N. Y. Sales Office: 50 Church St. • Cable Address: Bromach, N. Y.

SUPPLYING THE MOLDING INDUSTRY SINCE 1909

Exactly what can you expect from Fire-Resistant Resproid?
"FIRE-RESISTANT" is a very indefinite term — you know that as well as we do.
But there are certain facts to know about the *Fire-Resistant* type of *Resproid* that will help you determine just how resistant to fire this lovely material is.
First, this type of *Resproid* is specially compounded to resist quick combustion. It will burn if held in direct contact with flame, but slowly enough to afford a high degree of safety.
Second, samples of *Fire-Resistant Resproid* have passed the California State Law setting the minimum fire safety standards for wearing apparel.
Third, *Fire-Resistant Resproid* has been tested by the Good Housekeeping magazine laboratories and given their Seal of Approval.
Besides its big safety feature, *Fire-Resistant Resproid* is made to resist cracking, fading, scuffing and abrasion — most acids, alkalies, oil, alcohol and grease. Its beauty is practical anywhere because dirt can be wiped off in seconds with just a damp cloth.
If you're not already familiar with this type of *Resproid*, send for samples of this lovely, durable material now. You'll find it adds new sales appeal to aprons, curtains, belts, waterproof garments — wherever you use it. Respro Inc., Cranston 10, Rhode Island.
Resproid
Guaranteed by Good Housekeeping
Resproid
Be sure to identify all your FIRE-RESISTANT RESPROID products with the special yellow and black tag carrying the words, "Resproid—Fire-Resistant". The big, new advertising campaign in Good Housekeeping makes the RESPROID label an important selling point for you.

PRODUCTION ANGLE

You're looking at something special,
in this Knapp-Monarch selector switch dial—
special in quality, yet special in cost.
Designed as a part for the famed K-M Speed Mix,
specifications called for moulded-in lettering
on the sharply tapered sides—deep enough to retain
wiped-on paint permanently.

Ordinarily such specifications would prevent
a straight draw from the mould because of undercuts
in each lettering stroke. And the ordinary
solution would be an intricate split-cavity mould with loose
pieces, not only costing considerably more in itself,
but inflating moulding costs as well.

But this isn't an ordinary job. The ordinary
8-cavity compression mould costs just a fraction
of what it might, and permits an economical
moulding schedule. The trick's in the hand engraving
on the hob. Though seemingly engraved at right
angles to the casting surface, the hob was actually
engraved at *right angles to the base of the hob,*
permitting a straight draw from the mould!

Speed Mix,
by Knapp-Monarch

Selector Switch Dial, *by Kurz-Kasch*

letter-perfect

Because of this one Kurz-Kasch production idea, Knapp-Monarch, a manufacturer of quality items in a competitive field, can maintain quality and cut cost. We've a lot of similarly effective notions — none of them confined to any one particular field — and we've been applying 'em to our customers' problems since Plastics began. Here at Kurz-Kasch we're equipped to handle your entire moulding job from start to finish, and ready to talk business. May we send an engineer?

Kurz-Kasch

FOR OVER 33 YEARS PLANNERS AND MOULDERS IN PLASTICS

Kurz-Kasch, Inc. • 1415 South Broadway • Dayton 1, Ohio

BRANCH SALES OFFICES: New York, *Lexington 2-6677* Chicago, *Harrison 5473* • Detroit, *Randolph 5214* Los Angeles, *Prospect 7503* • Dallas, *Lakeside 1022* St. Louis, *Rosedale 3542* • Toronto, Canada, *Adelaide 1377.*

EXPORT OFFICES: 89 Broad Street, New York City, *Bowling Green 9-7751.*

DETROIT PUBLIC LIBRARY

SPECIAL PRESSES

ENGINEERED BY ELMES

Good Hydraulic Production Equipment Since 1851

There are times when a *standard press* won't do. Then, it's time to call in Elmes. Whether the press you need is *special throughout,* or just changed from existing designs, Elmes background, facilities, and foresight are shortcuts to satisfaction *and profits.*

A SIMPLE ADAPTATION... Here's an Elmes adaptation that is *both* simple and effective. Basically, it's a standard 300-ton compression press arranged for transfer molding. But it has *two rams*—instead of one—to provide high volume and proper flow. It's compact, economical—has free access front and back.

COULDN'T PERFORM BETTER... Each transfer ram delivers 50-ton pressure while a *separate* pump holds the mold closed. And, had the whole press been developed for this particular use, it *couldn't* perform better. For special presses, and standards, too, it always pays to *"Put Your Pressing Problems up to Elmes."*

Ask for New Bulletin 5200-A. It's Free to Plastics Molders.

● You can speed plastics molding with modern Elmes equipment. Standard units include a full range of compression and transfer molding presses; Elmes Hydrolairs—the power presses with neither pumps nor motors; hobbing presses; laboratory presses; and Elmes pump-accumulator systems for group press operation.

Elmes hydraulic equipment does these four things —Saves Time... Saves Effort... Saves Maintenance... Saves Money. That's why leaders in the industry are Elmes users. Bulletin 5200-A gives features, specifications, and dimensions of Elmes equipment for plastics molders. Ask your Elmes distributor, or request by mail.

ELMES ENGINEERING WORKS *of* AMERICAN STEEL FOUNDRIES, 225 N. Morgan St., Chicago 7, Ill.

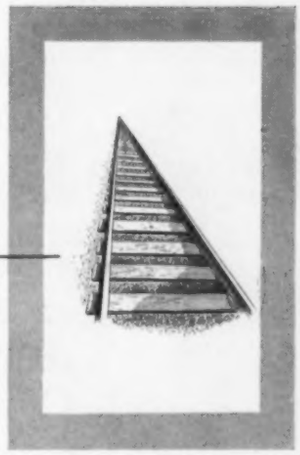
Distributors in Principal Industrial Centers • *Also Manufactured in Canada*

METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES

ALL YOU WANT IN STEARATES

QUALITY

For more than a quarter of a century, Witco Stearates have been noted for their high quality. And Witco's constant research and testing methods see to it that the high quality of these stearates will always continue.



UNIFORMITY

Witco Stearates have an enviable reputation for dependable uniformity and fine fluffy texture. These qualities are assured by careful technical control . . . from start of production to packaging.

FULL RANGE

Witco's line of quality stearates includes aluminum, barium, calcium, lead, lithium, magnesium, zinc—and others for special applications. *All* are in wide use throughout industry.

PROMPT DELIVERY

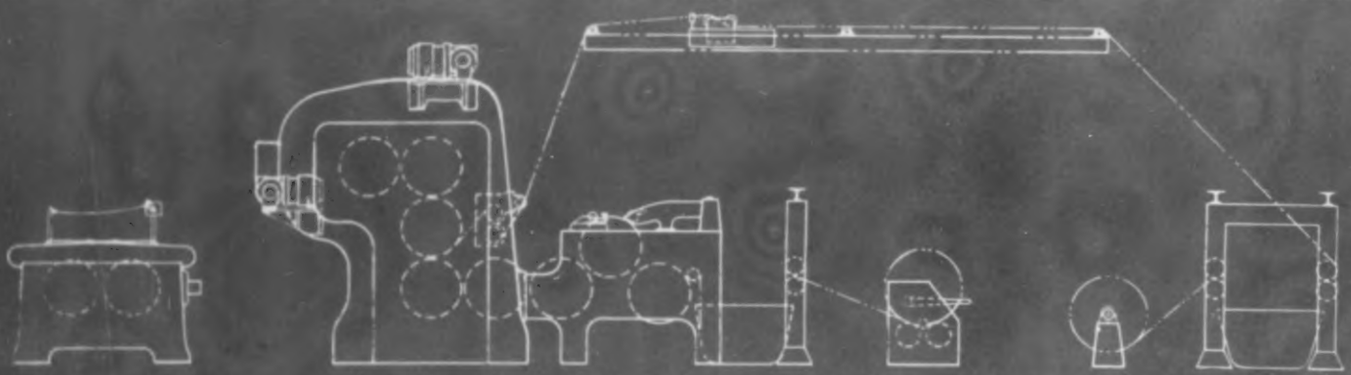
Ample supplies of Witco Stearates, produced at Witco's two plants, are stocked at convenient shipping points so that you get prompt delivery. Place your order today and *see*. Samples on request.

WITCO CHEMICAL COMPANY

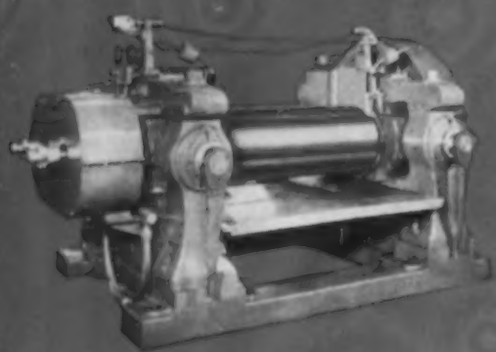
295 MADISON AVENUE
NEW YORK 17, N. Y.

Los Angeles • Boston • Chicago
Detroit • Cleveland • San Francisco
Akron • London and Manchester, England

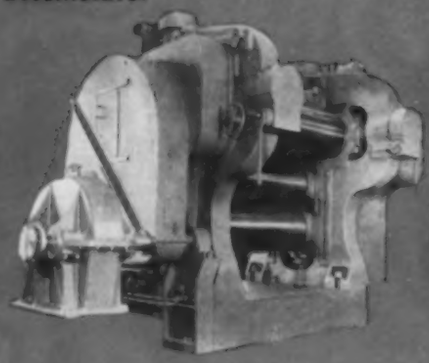
Engineered Equipment
for *Continuous Processes*



Continuous Calendering Process for supported or unsupported plastic sheet. Equipment includes fabric let-off stand with accumulator scray, fabric centering device, fabric pre-heating rolls, four-roll Calender, cooling rolls, and fabric wind-up with accumulator scray. Also included are facilities for trimming and winding up unsupported sheet. A stock warming up Mill is included, with stock transfer feeding conveyors as required.

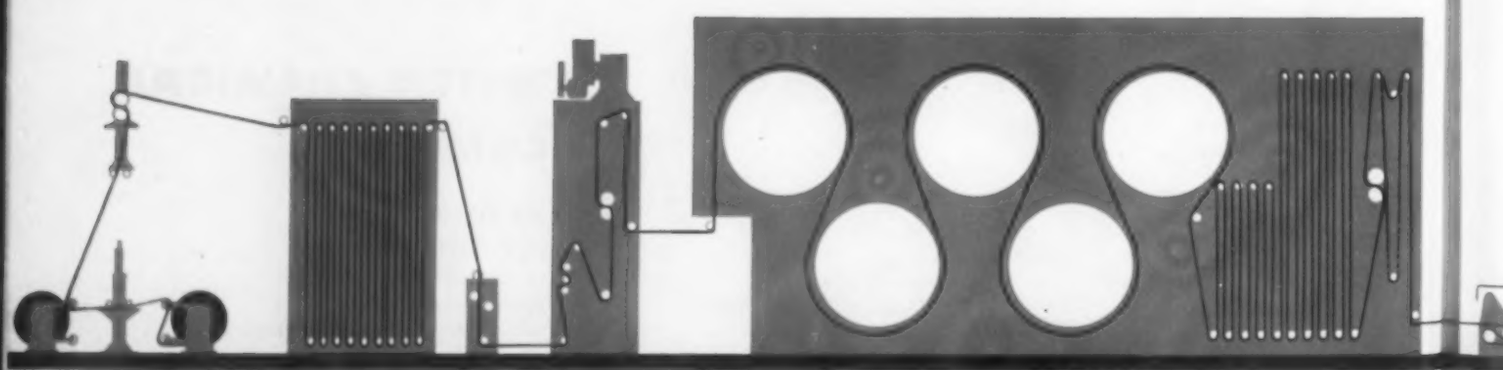


Warming and mixing Mill for plastics, 22" and 22" x 60", equipped with oil flood lubrication system, high pressure rotary joints, and tiltable stock guides.



Four-roll Calender for plastics, 24" x 68", including oil flood lubrication system, bored rolls, adjustable stock guides, high pressure rotary joints, motorized two-speed roll adjustment, and hydraulic roll stabilizing equipment.

Film and Fabric Cooling Roll Unit, with film trimming and wind-up device for mounting at the Calender.

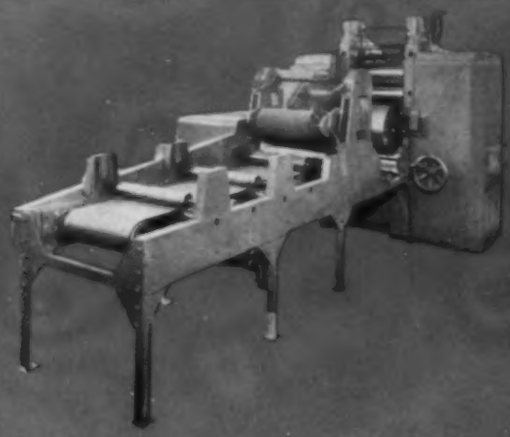


Continuous tire fabric processing unit, including pre-dipping, drying, calendering, cooling, and wind-up equipment.

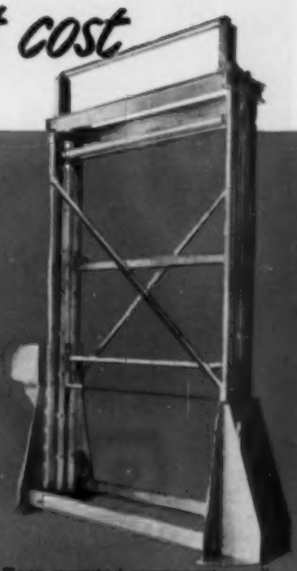
We engineer, build and install continuous processing equipment for the manufacturer of rubber or plastics products. Your inquiry concerning special or unusual requirements is invited. Our engineers are available for consultation.

Improve product quality–lower product cost

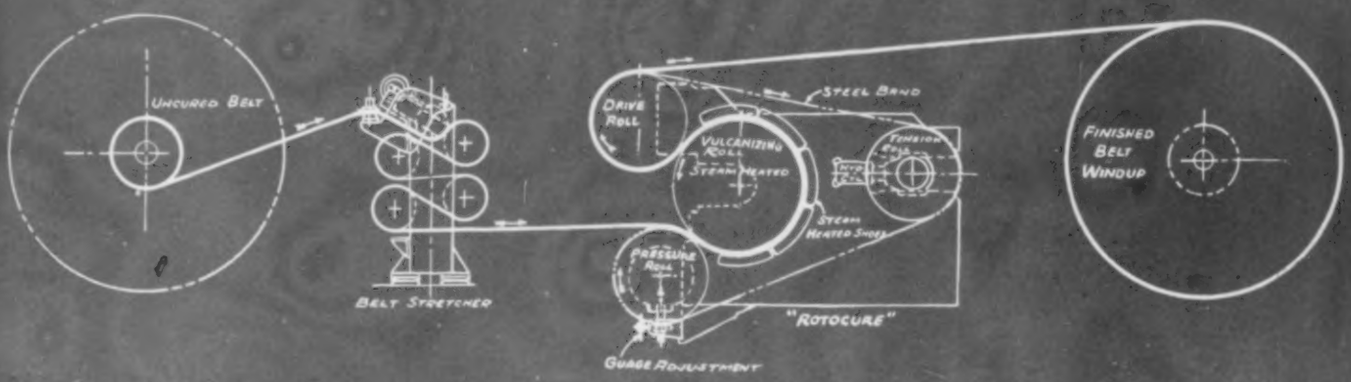
Unit for winding rubber sheeting on curing drums. Included are motor drive, stock let-off stand with liner wind-up and fabric let-off stand.



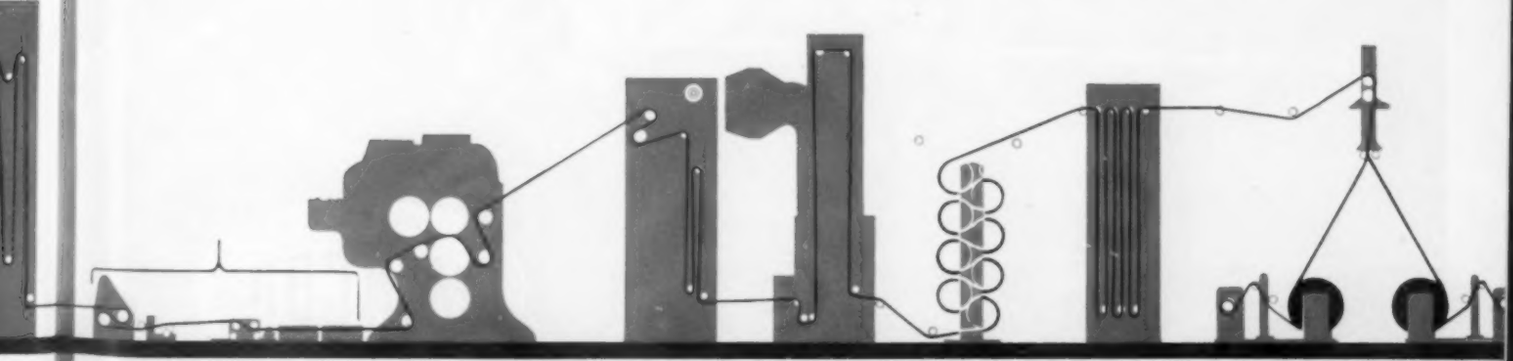
Combination Cooling, Slitting and Double Wind-Up Equipment for plastic film for use with four-roll Laboratory Calender.



Floor-mounted compensator roll stand used for coordinating the speed of machines in a continuous fabric processing installation.



"ROTOCURE" process for continuous vulcanization of belting and floor matting. The stretcher is not used when running matting. Built under license from Boston Woven Hose & Rubber Company.



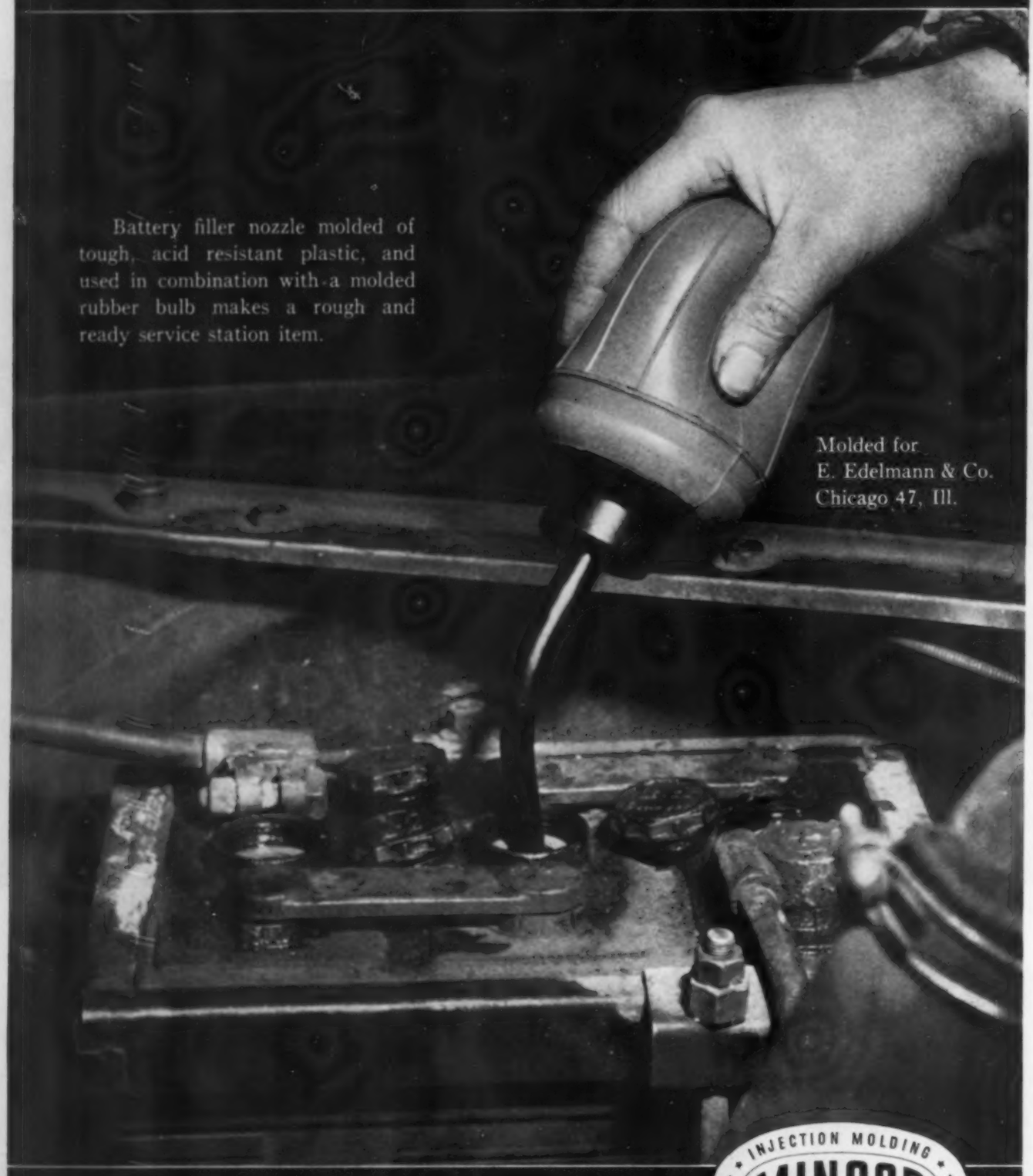
ADAMSON UNITED COMPANY

AKRON, OHIO

SUBSIDIARY OF UNITED ENGINEERING & FOUNDRY COMPANY

Branch Offices: NEW YORK: 441 Lexington Ave.
CHICAGO: 140 S. Clark St.
LOS ANGELES: 5140 Crenshaw Blvd.
PARIS: 5 bis Rue Massenet
INDIA: Ajupura, Post Anand, Bombay Province

For Thirsty Batteries!



Battery filler nozzle molded of tough, acid resistant plastic, and used in combination with a molded rubber bulb makes a rough and ready service station item.

Molded for
E. Edelmann & Co.
Chicago 47, Ill.

INJECTION MOLDING
MINCOR
YOUR PLASTICS DEPARTMENT

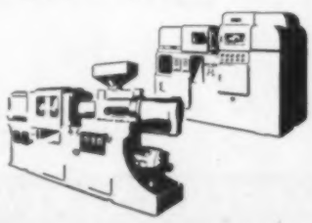
MINNESOTA PLASTICS CORP.

366 WACOUTA • ST. PAUL 1, MINN.

Stepped-up time cycling—a speeding-up that pays off in molding profits—is something you're bound to want to look into. The new-design Fellows-Leominster machines are just about the last word in high-speed-molding capacity. Fellows engineering is moving this line of Injection Molding equipment out in front. Every man in the market for 1949 equipment owes it to his pocket book to investigate—AND COMPARE!

Design Features that put money in the user's pocket.

- New automatic preheat of material, readies the shot for faster plasticizing.
- New clock-controlled booster for faster injection and better control.
- New built-in pyrometers for all-'round convenience.
- New super Speed-Flo cylinder design, with Taper-tite torpedo.
- New injection plunger pre-positioning to save half of injection time.
- and many other exclusive points of superiority.



Fellows LEOMINSTER injection molding equipment

WANT THE DETAILS?

Sign below and let us send you the new catalog information

Name_____ Title_____

Company_____

What capacity most interested in?_____ or_____

Street Address_____

City & State_____

THE FELLOWS GEAR SHAPER CO., Plastics Machine Div., Head Office & Export Dept., Springfield, Vt. Branch Offices: 616 Fisher Bldg., Detroit 2. 640 West Town Office Bldg., Chicago 12 • 7706 Empire State Bldg., New York 1 • New England Distributor: Leominster Tool Co., Leominster, Mass.

more fastening-wise manufacturers call on Parker-Kalon

...BECAUSE THEY GET MUCH more THAN SELF-TAPPING SCREWS ALONE

more **"KNOW-HOW"** — P-K originated the Self-tapping Screw, has been the leader with new designs ever since.

more **"SHOW HOW"** — The P-K staff of Assembly Engineers advise designers and assembly supervisors how to make better assemblies, lower fastening costs, — have helped solve nearly a million application problems during 35 years of specialization on this type of fastener.

more **TYPES AND SIZES** — P-K makes *six* types of Self-tapping Screws, the only complete line. P-K advice is unbiased, fits the screw to the job, not the job to the screw.

more **EXACTING QUALITY CONTROL** — With an investment in laboratory testing and inspection equipment unsurpassed in the industry, P-K customers can depend on uncompromising quality.

more **PRODUCTION** — P-K is the world's leading manufacturer of Self-tapping Screws, offering a steady supply to fill any size orders.

more **TOP-RATED DISTRIBUTORS** — Everywhere throughout the U. S. and Canada, P-K Self-tapping Screws are available from leading distributors, ready to give you quick, complete service.

only **PARKER-KALON** offers all these *extras*. Make sure you get them. Whether your product is in the planning stage or in production, call in a P-K Assembly Engineer. If you prefer, mail assembly details for recommendations. You'll see why, as every user knows, when you buy Self-tapping Screws, *you're* O.K. with P-K! Parker-Kalon Corporation, 200 Varick St., New York 14, N. Y.

P-K® The Original

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

PARKER-KALON SELF-TAPPING SCREWS

PARKER-KALON PRODUCTS COLD-FORGED SOCKET SCREWS, WING NUTS, THUMB SCREWS • HARDENED SCREWNAILS AND MASONRY NAILS SHUR-GRIP FILE AND SOLDER IRON HANDLES • METAL PUNCHES • DAMPER REGULATORS AND ACCESSORIES

...and that's where KYS-ITE comes in!

If you have a breakage problem now... or if the piece you're planning must have high impact strength combined with permanent luster... why not get further information about KYS-ITE.

This thermosetting plastic... and Keyes extensive experience as custom molders... account for KYS-ITE's unusual success where extraordinary strength is needed... its desirability where general-purpose phenolics cannot fill the bill.

Keyes offers a complete service... compression molding to your specifications... delivering the finished article or component parts. Should you require the special properties of this unusual plastic, we invite your inquiry.

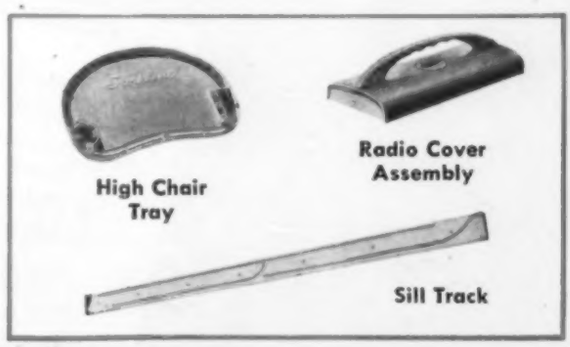
NOTE: While KYS-ITE's primary advantages are great strength and lustrous finish, this plastic is also notable for light weight, good dielectric properties, adaptability (unusually long pieces, odd shapes, thin-walled sections) and easy cleaning properties. Examples of custom-molded KYS-ITE items are shown below.

KEYES FIBRE COMPANY
420 Lexington Avenue
New York 17, New York
Plant at Waterville, Maine

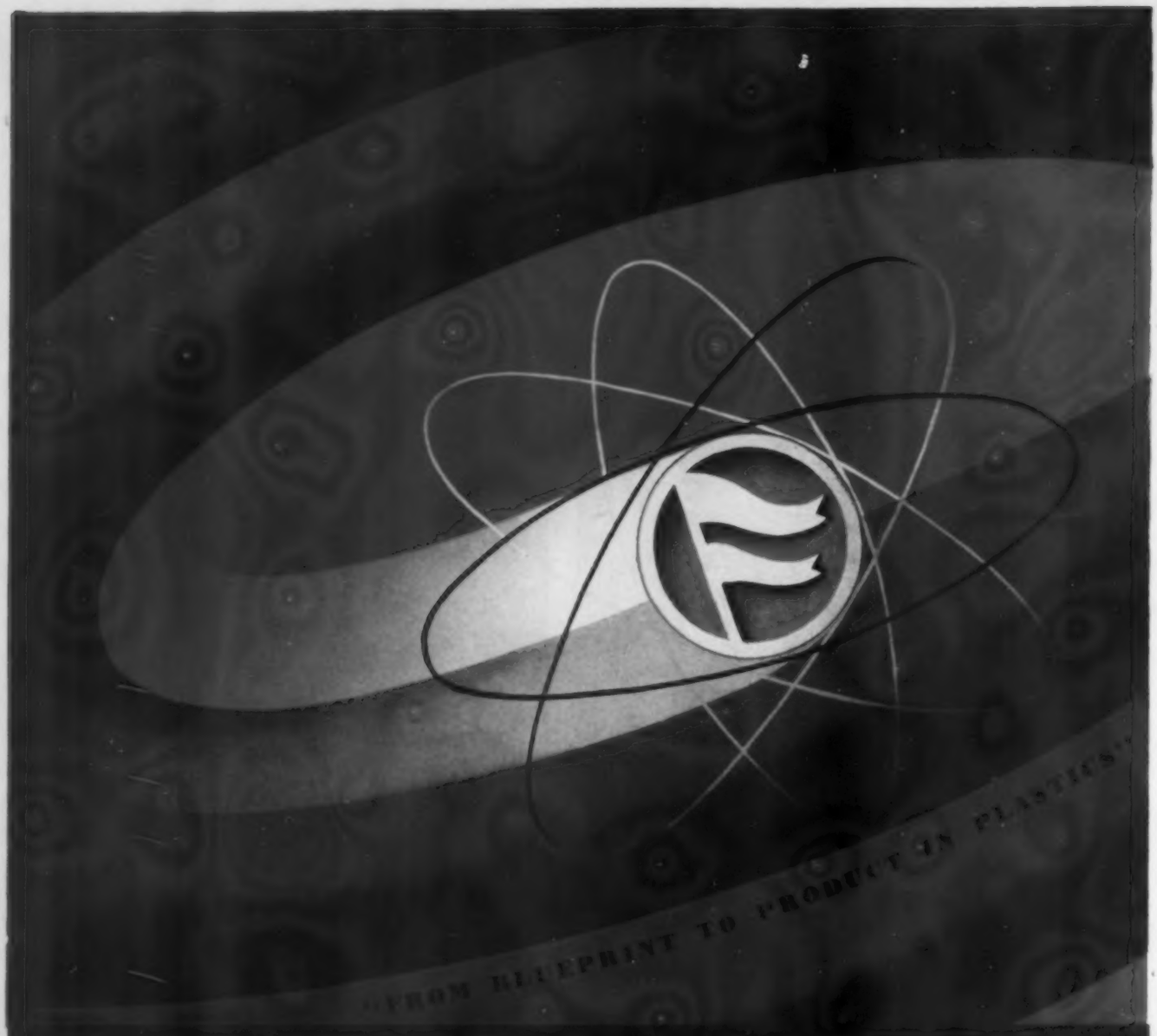
KEYES
MOLDED PRODUCTS

KYS-ITE

Reg. U.S. Pat. Off.



PREFORMED PLASTIC COMBINING LONG-FIBERED WOOD PULP AND SYNTHETIC RESIN



FELSENTHAL PLASTICS

G. FELSENTHAL & SONS, INC.
4120 W. Grand Ave. • Chicago 51, Ill.

New York Office
225 W. 34th St., New York 1, N. Y.

Detroit Office
731 Fisher Building, Detroit, Mich.

COMPLETE PRODUCTION SERVICES
including

- Injection Molding
- Complete Fabricating and Assembly Facilities
- Pressure forming and Deep Drawing of Acrylic Sheet
- Finishing, Spraying, Painting and Bright Silvering

All Thermoplastic Materials

UNICOLOR

SAVES YOU 3 to 4 cents PER POUND ON COLORED EXTRUSIONS

NEW MOLECULAR BLENDING PRINCIPLE INSURES COLOR UNIFORMITY FOR STANDARD, SPECIALLY MATCHED, AND APPROVED NEMA COLORS

Profits increase tremendously when you use the newly developed plastics colorant, UNICOLOR, to color your vinyl, polyethylene and Geon* extrusions. UNICOLOR enables you to save by purchasing the lower priced uncolored resin granules which you may color as needed, as uniformly as the manufacturer can...and at a saving of from three to four cents per pound.

NO STREAKING, NO BLISTERING, NO BLEEDING

UNICOLOR consists of specially prepared, color saturated resin granules containing all the tested and approved pigments necessary to produce the finished color. After one simple weighing (1 part UNICOLOR to 24 parts uncolored plastic), the UNICOLOR and uncolored plastic are fed into your extruder together. The UNICOLOR granules, having the same chemical characteristics as the resins, fuse and combine with them into a molecular blend, and distribute their color evenly throughout the mass. Hence, you obtain a color-blended, uniform material which doesn't streak or blister upon extrusion, which can be extruded at the same speeds as uncolored plastics, and which can't possibly clog screens because it is completely homogeneous. What's more, as coloring and extrusion are simultaneous, you need never prepare more colored material than you actually will use for the job being run.

NO WAITING FOR COLORS

In addition to making substantial savings, by maintaining a supply of uncolored plastic on hand, plus UNICOLOR in a variety of colors, you avoid waiting for resin suppliers to run the particular color you desire. In standard colors, UNICOLOR can be delivered immediately; special colors can be matched, prepared and delivered quickly.

NO DUST CONTAMINATION

Since UNICOLOR granules are virtually free from flying dust, using them cuts your contamination problem to a bare minimum. You can actually run different colors on two adjacent extruders with no chance of having the color used in one unit deposited on extrusions produced on the other—as frequently happens when other methods of dry coloring are employed. There are never any traces of air-borne coloring matter on extruding machines, take-ups, or other equipment when you do your coloring with UNICOLOR.

TEST UNICOLOR YOURSELF

Only by testing UNICOLOR in your own extruder can you really tell how simple it is to use, how perfect the results are, how much cheaper it is than buying pre-colored plastics. Address your requests for free samples, details and prices to UNICOLOR DIVISION, Westchester Plastics, Inc., 326 Waverly Avenue, Mamaroneck, New York.

**Reg. Trademark B. F. Goodrich Chem. Co.*

Westchester
PLASTICS INC.
CUSTOM COMPOUNDERS OF THERMOPLASTIC MATERIALS

NRM *PIONEERS IN PLASTICS PROCESSING MACHINERY*

IN 1939 NRM built the first Extruder designed especially for the extrusion of thermo-plastics materials.

IN 1949 NRM Plastics Extruders are the most widely used in the industry. The reason—no other Extruder has all these cost-cutting features!

10 YEARS . . . . *devoted exclusively to the development of plastics extrusion equipment—put this experience to work for you!*

NRM features that make Extrusion the Process for Profit!

1. **CREATIVE ENGINEERING.** Complete division with laboratory facilities devoted exclusively to design, development and improvement of plastics equipment.
2. **HEAVY-DUTY CONSTRUCTION.** Engineered for long life, trouble-free operation.
3. **QUANTITY AND QUALITY OF PRODUCTION.** Large output of close tolerance extrusions.
4. **FLEXIBILITY.** All extruders can be readily adapted for wire covering, sheet extrusions, tubular shapes, and an infinite variety of profiles.
5. **TORPEDO SCREWS.** Patented *exclusive* NRM design for far better extrusions of most *rigid* materials.
6. **FULL FLIGHTED SCREWS.** For elastomeric materials—Proven designs with thousands of hours of satisfactory performance.
7. **FEED SCREWS.** Made from special, high grade heat treated forged alloy steel, chrome plated, with surface hardened flights. Long drive shank extension holds screw in perfect alignment in cylinder, prolonging life of screw and cylinder liner. Hollow bored for fluid heating or cooling. Easily removable through front of extruder.
8. **CYLINDERS, OIL HEATED—STEAM HEATED—ELECTRICALLY HEATED.** Cylinders are designed with a series of individual zones for heating and cooling.
9. **FEED OPENINGS.** Properly designed for either granular, powder or strip feed.
10. **AIR GAP.** Space between hopper end of cylinder and gear housing to minimize transfer of heat from cylinder, and permit ease of inspection and maintenance of thrust bearing oil seal.
11. **SWING TYPE DIE ADAPTER GATE.** Hinged for quick changing of screens and dies, to include electric heater, temperature control and thermometer. Quick opening.
12. **DRIVE GEAR UNITS.** Heat treated, cut steel herringbone gears throughout. All shafts mounted in heavy-duty roller bearings. All gear housing joints oil tight, self-lubricating system, eliminating force feeding.

NRM

NATIONAL RUBBER MACHINERY CO.
General Offices: AKRON 8, OHIO

Plastics MACHINERY DIVISION

EXPORT DISTRIBUTORS: OMNI PRODUCTS CORPORATION, 460 FOURTH AVE., NEW YORK 16, N. Y.

STABILITY . . . Marvinol VR-10 is superior in resistance to heat, light and other normally destructive factors.

VERSATILITY . . . Marvinol VR-10 is easy to process . . . may be calendered, extruded, injection molded, used in non-aqueous dispersions, formulated as unplasticized rigids . . . uniquely versatile.

TOUGHNESS . . . Marvinol's high molecular weight offers you extra toughness and "dryness" with long life . . . resists tear, wear, oils, acids.

. . . here's why industry is turning to MARVINOL® the unique VINYL RESIN

WIDER TEMPERATURE RANGE . . . Marvinol VR-10 assures you products that show less deformation due to heat . . . gives greater low temperature flexibility.

COLOR . . . Marvinol offers many opportunities for distinctive coloring . . . from clear to delicate or brilliant shades.

EASILY CLEANED . . . Marvinol-based products are easily and quickly cleaned because of their smooth surface. They're waterproofed, unaffected by mold or fungi.

The New Ultra-Modern Marvinol Plant contains the latest equipment to assure efficient operation, uniform production of the highest quality. Send today for details. Write on your company letterhead to Chemicals Division, Dept. D-3. The Glenn L. Martin Company, Baltimore 3, Maryland.

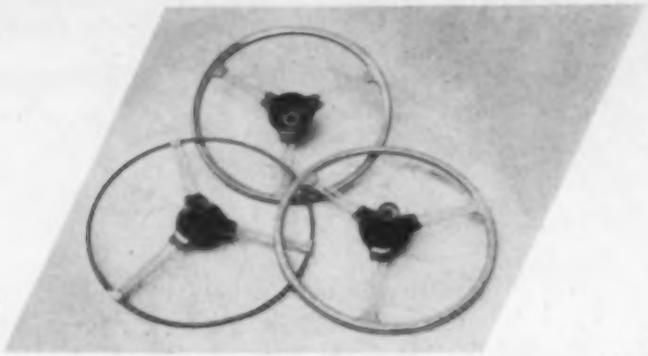
CLOSE COOPERATION . . . The Glenn L. Martin Co. compounds and fabricates only in its customer service laboratory for your benefit. We sell only raw materials. Our sales engineers and modern customer research laboratory are ready to help with your processing problems.

Martin Marvinol

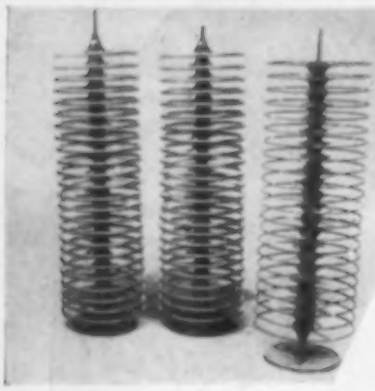
RESINS, PLASTICIZERS AND STABILIZERS PRODUCED BY THE CHEMICALS DIVISION OF

THE GLENN L. MARTIN COMPANY • AN INTERNATIONAL INSTITUTION

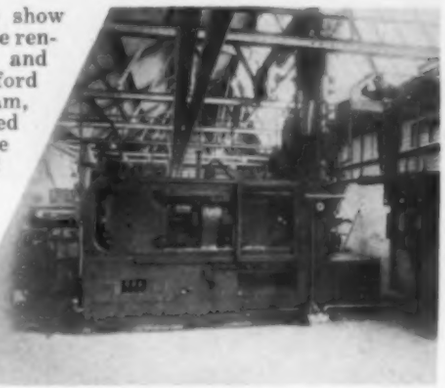
"BETTER PRODUCTS, GREATER PROGRESS, ARE MADE BY MARTIN"



L IS FOR LATITUDE OF SERVICE



The photographs on this page show the results of the complete service rendered by Lester-Phoenix, Inc. and Lester Engineering Co. to Clifford Covering Co. Ltd. in Birmingham, England. The steering wheel produced there is molded of cellulose acetate and cellulose acetate butyrate on a 32 ounce Lester in a cycle as low as one minute (average time: 75 seconds). The complete job was engineered by Lester Engineering—even to having the molds designed and produced locally. Such typically thorough service is what makes the Lester "L" a symbol of the finest injection molding equipment, as well as complete cooperation with Lester users.



. . . . WORLD-WIDE, TOO!

Write for your free copy of the Lester Press.

LESTER INJECTION MOLDING MACHINES

distributed by LESTER-PHOENIX, INC., 2621 CHURCH AVENUE • CLEVELAND 13, OHIO

REPRESENTATIVES

New York . . . . . Steven F. Krould
Chicago . . . . . Elmer C. Maywald
Detroit . . . . . Thoresen-McCosh
Cincinnati . . . Index Machinery Corp.
St. Louis . . . . . L. H. McCreery
Los Angeles . . Seaboard Machinery Co.
New England . . . Kavanagh Sales, Inc.
Cleveland . . . . . Don W. Williams
San Francisco . . . . . J. Fraser Rae
Philadelphia . . Wright & Gade Tool Co.
Milwaukee . . Marquette Engineering Co.

FOREIGN

Toronto, Canada Modern Tool Works, Ltd.
London, England . . Dowding & Doll, Ltd.
Calcutta, India . . . Frances Klein & Co.
Sydney, Australia . Scott & Holladay, Ltd.

Carbolac 2

CABOT
CARBON BLACKS
FOR
PLASTICS

For Polyethylene

Monarch 71

GODFREY L. CABOT, INC.

CABOT

This Outstanding Electric Range . . .

Deserves This Outstanding Trademark

. . . in ERIE RESISTOR "Three Dimensional" Plastics

The new General Electric "Push-button" Range is distinctive for its eye-catching appearance as well as its performance. G-E identifies itself as the creator of this great new electric range by displaying its well-known trademark in colorful Erie Resistor "Three Dimensional" Plastics.

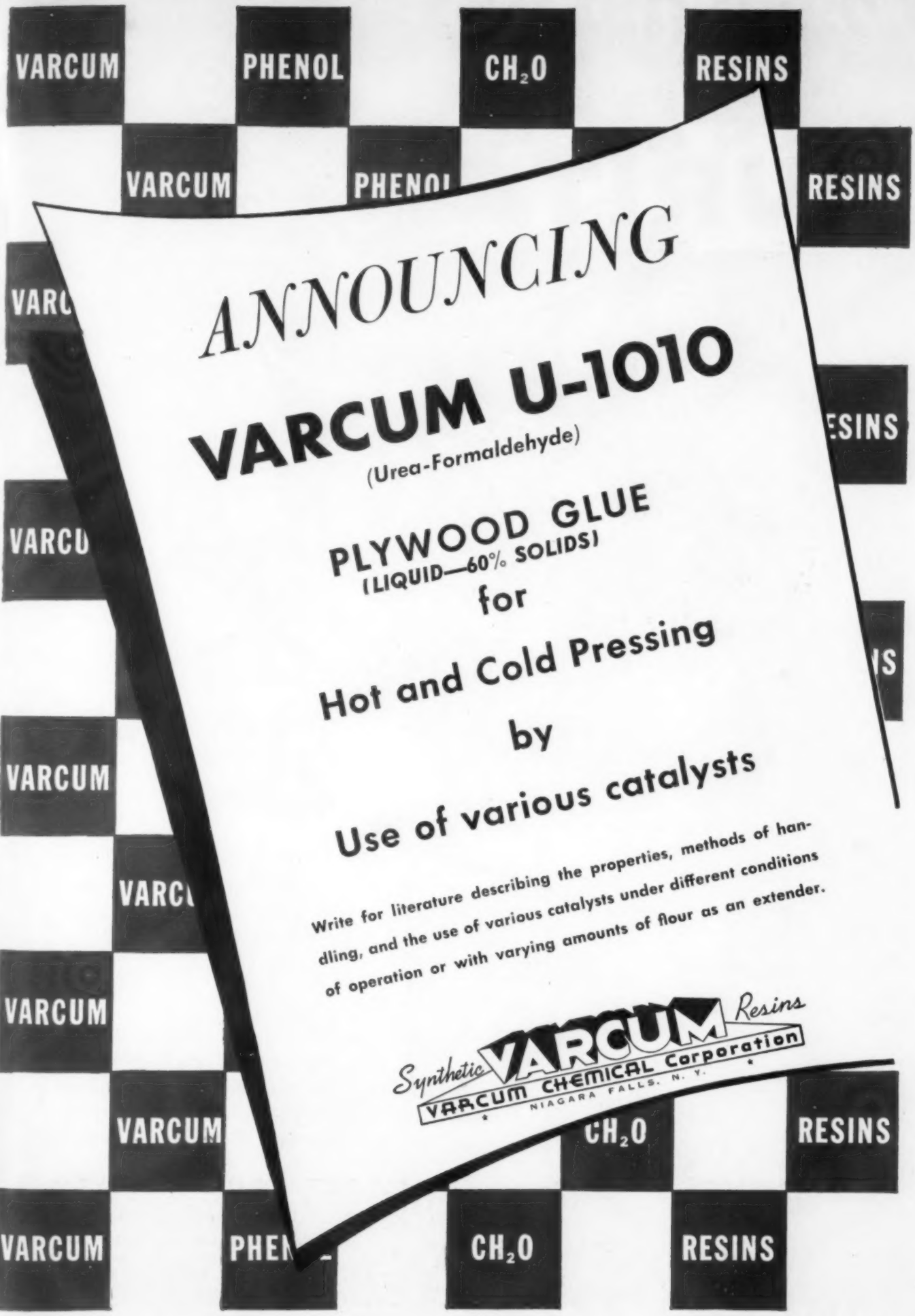
Trademarks and trade names never lose their brilliance when reproduced in Erie Resistor "Three Dimensional" Plastics. There is a depth of color unobtainable with any other molding method. Lettering and design stand out in bold relief . . . permanently protected against fading and erasure.

Regardless of your plastic needs—whether for product identification, a functional product part, or a sales-slanted, durable package—you will find the answer at the Plastics Division of Erie Resistor, the pioneer custom injection molder.

Plastics Division

ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND · · TORONTO, CANADA


VARCUM
PHENOL
CH_2O
RESINS
ANNOUNCING
VARCUM U-1010
(Urea-Formaldehyde)
PLYWOOD GLUE
(LIQUID—60% SOLIDS)
for
Hot and Cold Pressing
by
Use of various catalysts
Write for literature describing the properties, methods of handling, and the use of various catalysts under different conditions of operation or with varying amounts of flour as an extender.
Synthetic VARCUM Resins
VARCUM CHEMICAL Corporation
NIAGARA FALLS, N. Y.

DURITE

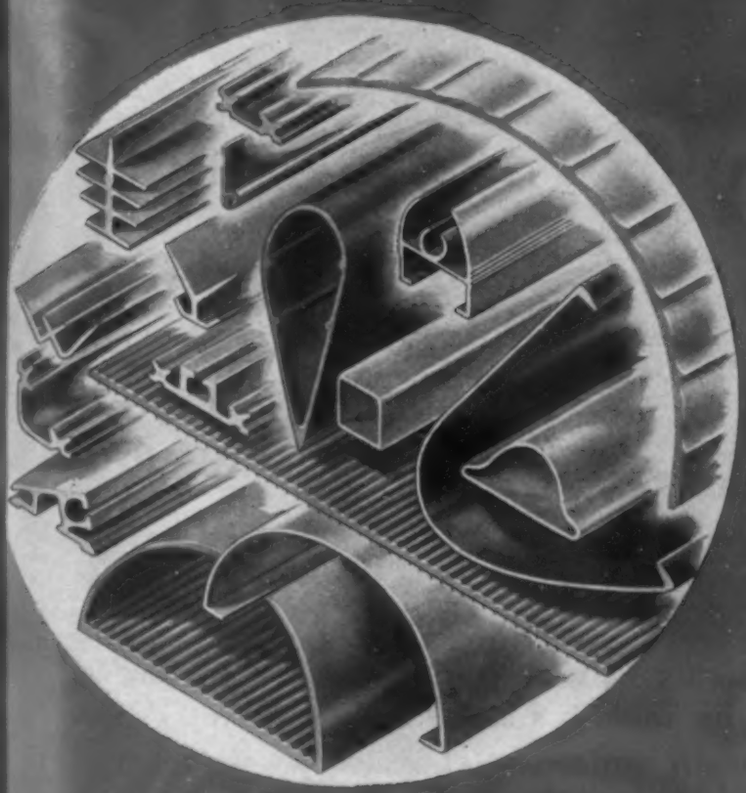
- ADEQUATE INSULATION
- LIGHTNESS IN WEIGHT
- RESISTANCE TO WATER
- HIGH HEAT RESISTANCE
- DURABLE GLOSSY FINISH

DURITE Phenolic Compounds were used by Elyria Molding and Engineering Company for molding Steam Iron Handles of beauty and serviceability.

THE BORDEN COMPANY
Chemical Division
5000 SUMMERDALE AVE., PHILA. 24, PA.

PLASTIC PROCESS IS "ON THE SPOT"

with every type of EXTRUSIONS from twelve-inch sections to monofilaments



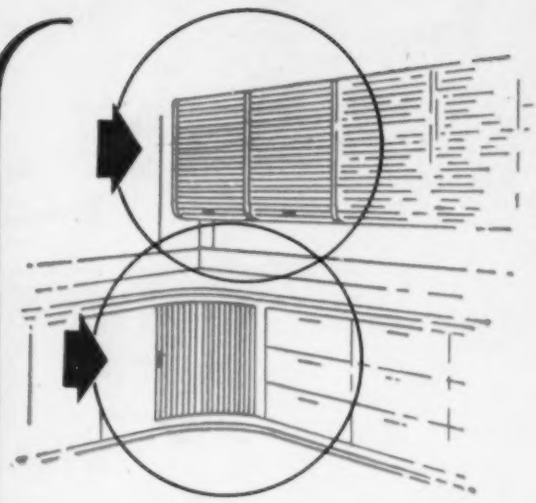
● FIRST to extrude plastics in the West — and first class in equipment, experience and ingenuity of applications.

You can turn your plastic problems over to Plastic Process with complete confidence that if it can be done in plastics, Plastic Process can do it supremely well.

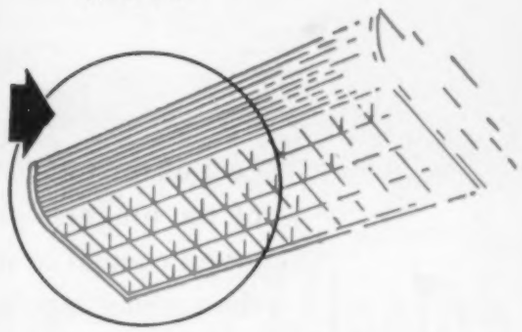
Equipped to handle every type of Thermoplastic Extrusions, including Polystyrene, Tenite, Ethyl Cellulose, Vinyls, Acrylics, Acetates and Polyethylene.

Rods, Tubes, Mouldings, Rings, Beads — practically any form of extrusion you require, in the materials most practical for each application.

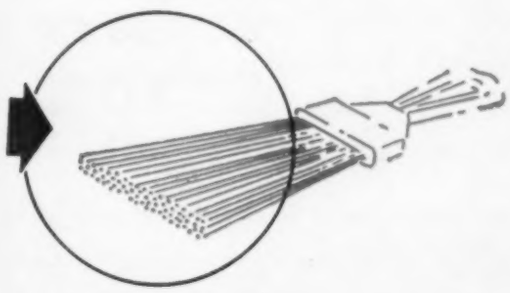
Communicate *today* with our Engineering Division and a competent specialist will be "on the spot" to help you solve your problem of extrusions — with efficiency and ECONOMY.



● THE PLASTIMODE *roll-a-way** door—"up at a touch and out of the way"—is a Plastic Process patent — worth investigating for its multitude of applications in many fields. In many colors. Sanitary, smart, easy to install. Also available in aluminum for industrial applications.



● FLUORESCENT FIXTURES — a Plastic Process specialty virtually since fluorescent lighting became the vogue. Use our wide experience to *your* advantage.



● MONOFILAMENTS of every type, uniform in dimensions, cut to any specified length at no additional charge with our automatic equipment.

PLASTIC PROCESS CO., INC.

662 NORTH ROBERTSON BLVD., LOS ANGELES 46, CALIF.

WINNERS HAVE WHAT IT TAKES

One of the toughest sports in the world is that of outboard racing. One of the toughest plastics in the world is a Nixon Cellulosic Plastic . . . tough enough to stand up under hard service yet flexible enough to meet the varying requirements found in different applications. Easily shaped and fabricated, it is a practical and economical plastic to use. Consider one of these Nixon Cellulosic Plastics . . . Nixon C/N (Cellulose Nitrate), available in sheets, rods, and tubes . . . Nixon C/A (Cellulose Acetate) and Nixon E/C (Ethyl Cellulose), available in sheets, rods, tubes, and molding powder.

LIKE **NIXON PLASTICS**

NIXON NITRATION WORKS • NIXON • NEW JERSEY

Representatives in Principal Cities • *Chicago Office*: 510 N. Dearborn Street, Chicago 10, Illinois

Canadian Distributors: CRYSTAL GLASS AND PLASTICS, LTD., Toronto, Can. • *Export Distributors*: OMNI PRODUCTS CORP., 460 4th Ave., N.Y. 16, N.Y.

Holy Water Fount Molded for Bristol-York Associates, Chicago

Reverence...in Plastics

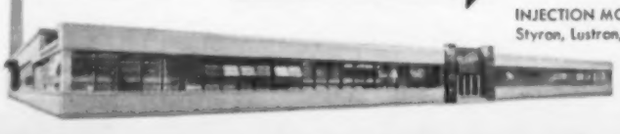
In molding this holy water fount, we humbly endeavored to express in it a feeling of simple beauty—dignity—reverence. This embodiment of moods in plastic materials is further evidence of our molding skill . . . an ability we feel sure can satisfy your most exacting demands in injection molding artistry and extrusion craftsmanship.

We apply equally painstaking care and skill to all types of molding assignments from the simple to the highly complex and in the desired mood, whatever it might be. Let us mold your product in the right mood for its most profitable use. We invite your inquiries without obligation.

Write on your letterhead for the new Injection Molded and Extruded Plastics Catalog. Or, for detailed information about MILLS-PLASTIC *, piping, tubing and fittings, write for circulars containing data and illustrations.*

**Trademark Registered*

NEW PLANT — NEW ADDRESS →



ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Fibestos, Lucite, Plexiglas, Nylon, Polystyrene, Styron, Lustron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Forticel, MILLS-PLASTIC *, Saran, and other Thermoplastic Materials.

2930 NORTH ASHLAND AVENUE • CHICAGO 13, ILLINOIS

Plastic Pacemaker

MOLDED BY MPc

FOR ADMIRAL TELEVISION

The fast-moving television industry recognizes the beginning of a trend in this Admiral unit . . . first to be housed with beauty and economy in plastics!

The idea was a "natural." Successful Admiral Radio-Phonographs in **MPc** plastic housings pointed to a ready demand for a plastic television set. Production, however, posed new problems. Front-to-back depth, sufficient to house the picture tube, called for a "draw" of 16¾ inches. The 16⅛ inch width and 9¼ inch height brought the weight to 10.4 pounds!

MPc engineering and production skills tooled and molded this precedent-making cabinet in one piece. The single molding operation provides 48 louvres for the speaker grill, cored-in openings for control shafts, lens window and ventilation, and cored mounting studs.

MPc welcomes the challenge of the unusual in plastics production. Submit your plastics product or problem to MOLDED PRODUCTS CORPORATION, 4535 W. Harrison St., Chicago 24, Illinois.

PLASTICS DIVISION

MOLDED MPc PRODUCTS

CORPORATION

COMPRESSION, INJECTION AND TRANSFER MOLDING

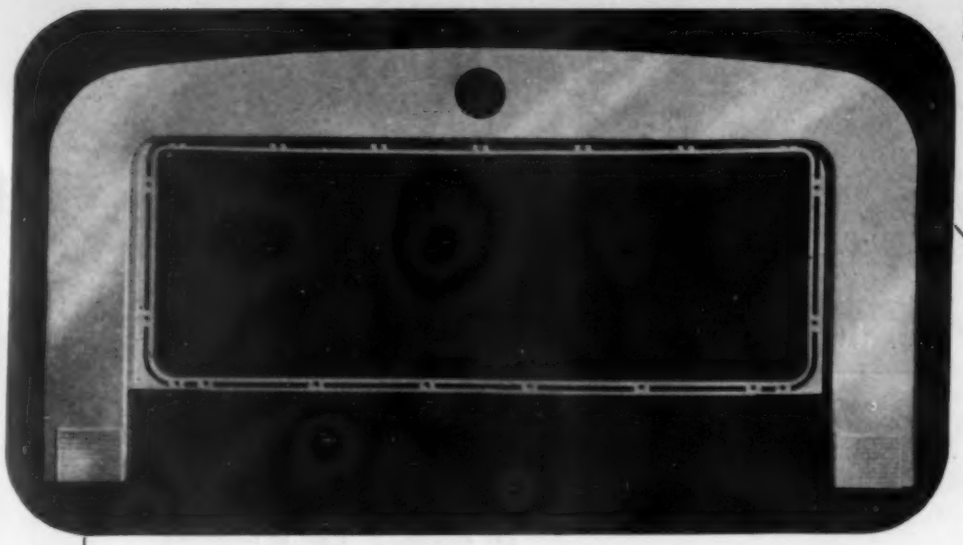


Photo courtesy of
Celanese Corporation of America

new pastel tints

color-engineered for refrigerator parts

depend on

TITANOX
PIGMENTS

The plastic housing for the freezing compartment of a popular refrigerator was styled to take on a newly-created "Apricream" shade.

To successfully achieve this tint, TITANOX pigments were chosen on account of their high strength and clarity — and most important of all — permanence of color.

Whenever you want to impart whiteness or clarity of tint . . . brightness and opacity to *any* type of plastic, let our Technical Service Laboratory help you select the titanium pigment that best suits your needs. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; 104 So. Michigan Ave., Chicago 3, Ill.; 2600 So. Eastern Ave., Los Angeles 22, Calif. Branches in all other principal cities. 7332

®TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

DESIGNING

Designing is a service which offers your product added sales appeal. Tomorrow's market will look for and demand the last word in design. We are in a position to aid you in preparing for these markets. For plastics . . . think of Bridgeport.

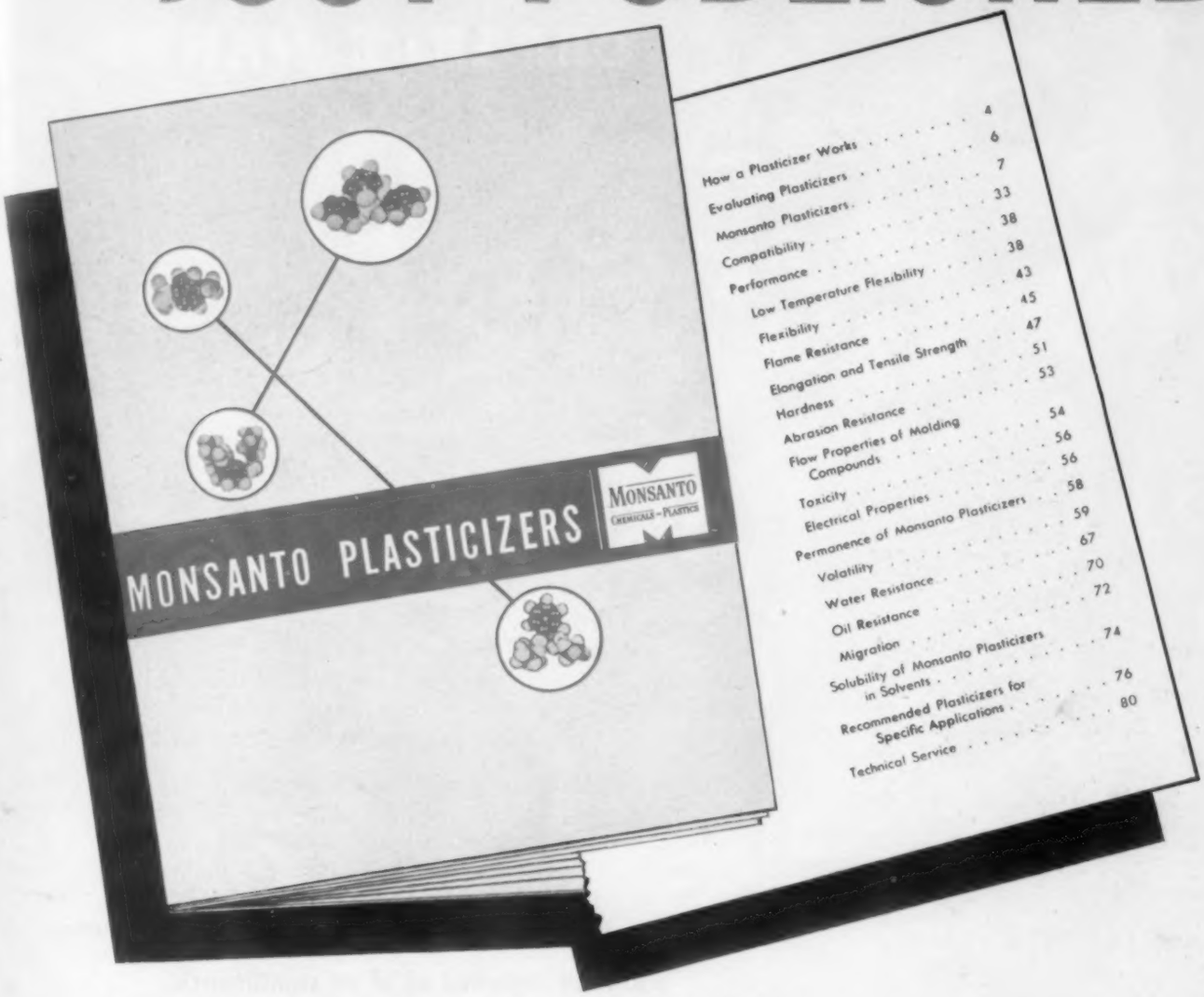
Bridgeport

BRIDGEPORT MOULDED PRODUCTS, INCORPORATED

BRIDGEPORT B CONNECTICUT

for industrial users of plasticizers

JUST PUBLISHED


MONSANTO PLASTICIZERS
MONSANTO
CHEMICALS - PLASTICS
How a Plasticizer Works 4
Evaluating Plasticizers 6
Monsanto Plasticizers 7
Compatibility 33
Performance 38
Low Temperature Flexibility 38
Flexibility 43
Flame Resistance 45
Elongation and Tensile Strength 47
Hardness 51
Abrasion Resistance 53
Flow Properties of Molding Compounds 54
Toxicity 56
Electrical Properties 56
Permanence of Monsanto Plasticizers 58
Volatility 59
Water Resistance 67
Oil Resistance 70
Migration 72
Solubility of Monsanto Plasticizers in Solvents 74
Recommended Plasticizers for Specific Applications 76
Technical Service 80

Industrial users of plasticizers will find a world of valuable information in "Monsanto Plasticizers," now available for distribution. It is a comprehensive 80-page treatise on plasticizing action, applications and performance results of Monsanto plasticizers.

If you want assistance in choosing — and using — the right plasticizer, send for a copy of this new book. Write on your company letterhead, or return the coupon. MONSANTO CHEMICAL COMPANY, Desk C, Organic Chemicals Division, 1707 South Second Street, St. Louis 4, Missouri.

MONSANTO
CHEMICALS FOR PLASTICS

MONSANTO CHEMICAL COMPANY
Desk C, Organic Chemicals Division
1707 South Second Street, St. Louis 4, Missouri

Please send me a copy of "Monsanto Plasticizers."

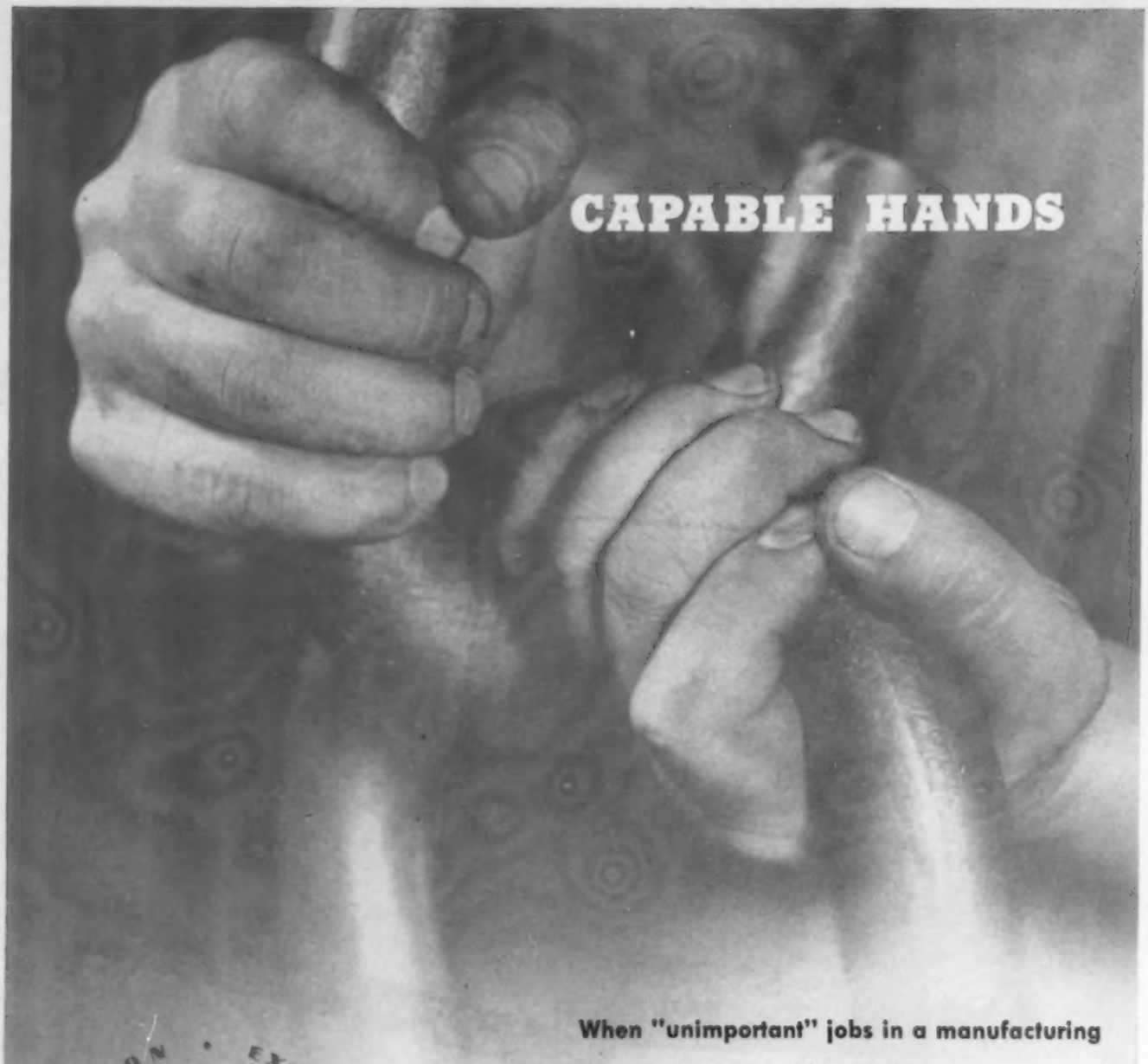
*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

SERVING INDUSTRY . . . WHICH SERVES MANKIND



PRECISION • EXPERIENCE • DEPENDABILITY

ALLIED CORPORATION PRODUCTS

When "unimportant" jobs in a manufacturing plant are regarded as of no significance, important operations can very well be seriously affected. That is why at Allied every job is important and is entrusted to capable hands. The "end result" is a product that has received careful attention in every department—that in every way reflects Precision, Experience, Dependability.

ALLIED PRODUCTS CORPORATION
DEPARTMENT 44
4622 LAWTON AVENUE • DETROIT 8, MICHIGAN

HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS
SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS • SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES

Two grades of FLEXOL Plasticizer DOP are now available from Carbide's expanded plant facilities.

DOP is the most widely used plasticizer for vinyl resins, because it combines so many desirable properties in one plasticizer. Highly compatible with vinyls, its low volatility and resistance to water extraction extend the useful life of vinyl products. Now . . . top quality is assured you by the availability of color-improved DOP from Carbide.

In nitrocellulose finishes DOP combines the desirable advantages of low volatility, excellent print resistance, and good cold-check resistance.

Samples of the new FLEXOL Plasticizers DOP and DOP-150 for your own evaluation will be supplied on request. Call or write our nearest office. When writing, please address Dept. L-3.

Performance in VINYLITE Resin VYNW (35.5% DOP)

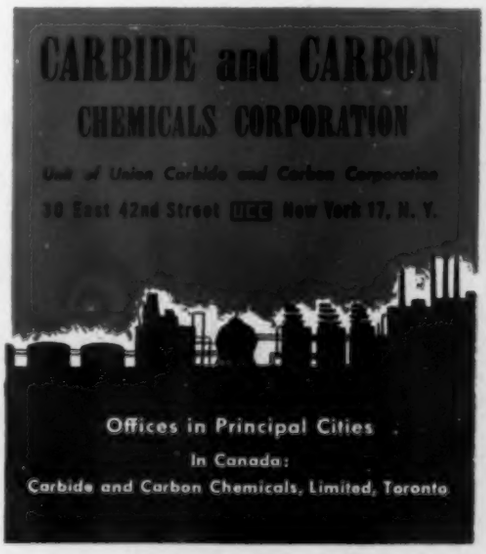
Plasticizer Loss in 10 days from 0.004" VYNW film:

Air, 60°C.	1.0%
Water, 25°C.	0.1%
Oil, 25°C.	13.0%
Brittle Temperature	−25°C.
Stiffness at -10°C.	28,000 psi

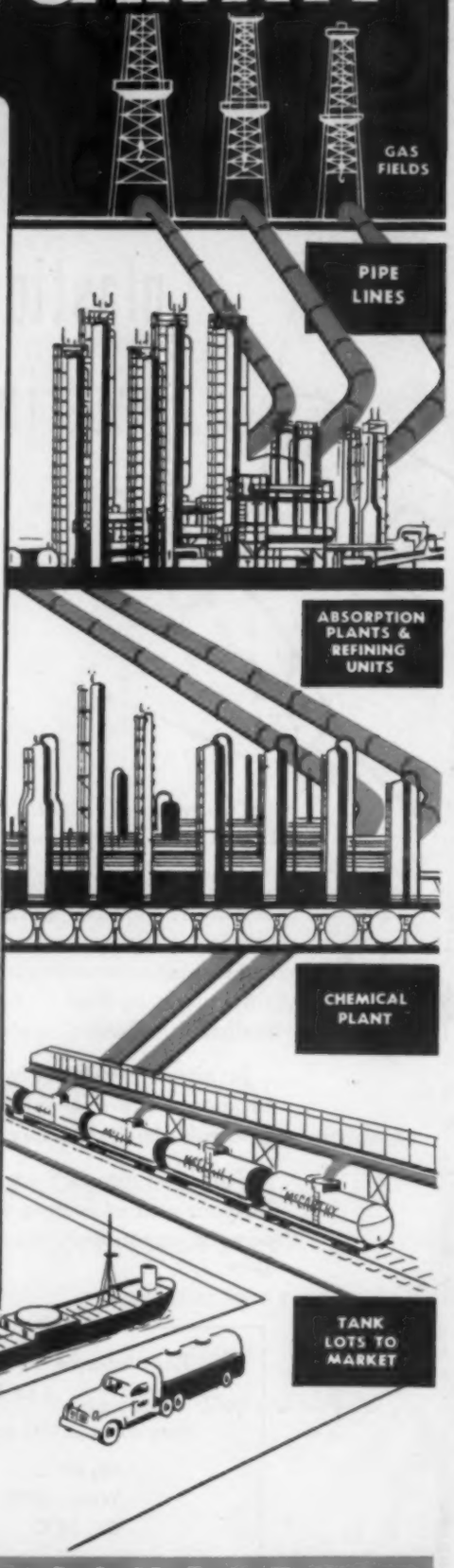
"Flexol" and "Vinylite" are registered trade-marks of C & CCC.

FLEXOL Plasticizer DOP for all non-electrical uses—maximum A.P.H.A. color of 100.

FLEXOL Plasticizer DOP-150 for electrical uses—D.C. resistivity over 2 x 10^5 megohm/cm. and a power factor under 4 per cent—maximum A.P.H.A. color of 150.


CARBIDE and CARBON
CHEMICALS CORPORATION
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street New York 17, N. Y.
Offices in Principal Cities
In Canada:
Carbide and Carbon Chemicals, Limited, Toronto

FLOW CHART CALLED McCARTHY



THE McCARTHY INTERESTS now form a flow chart that is unique in the production of primary and intermediate chemicals for Industry's expanding needs and exacting requirements. For this flow chart begins and ends with McCarthy-owned and operated facilities and resources that provide unlimited reserves of natural gas, a supervised gathering system, and the controlled processing of hydrocarbons. All these add up to predictable volumes of petrochemicals and assured supplies for the chemical processing industry.

From well to market, this steady, uninterrupted flow of vital raw products for plastics, dyes, explosives and various other chemical applications is meeting today's demands efficiently, economically and promptly.

McCarthy Chemical Company operates a fleet of 10,000 gallon tank cars, specially lined to guard against contamination, specially insulated against temperature changes; the company also maintains storage, dock and loading facilities on deep water.

NOW AVAILABLE . . .

- 37% Inhibited Formaldehyde
- 37% Uninhibited Formaldehyde
- Methanol
- Acetaldehyde
- Propane
- Butane
- Gasoline
- Kerosene
- Fuel Oils

IN THE INTEREST OF complete utilization of natural resources, McCarthy Chemical Company is also the supplier of abundant natural gas to industries of the Texas Gulf Coast — cheap, highly efficient fuel from which has been extracted the hydrocarbons diverted to the needs of the chemical industry. These practical developments in forward-looking conservation are dedicated to "New Horizons in Hydrocarbons."

A GLENN McCARTHY ENTERPRISE

McCARTHY

McCARTHY CHEMICAL COMPANY

G. M. McGRANAHAN, *Vice-President and General Manager*

SHELL BUILDING — HOUSTON, TEXAS TELETYPE HO-181 — PHONE: PRESTON 7204

For penicillin powder inhalation therapy
this disposable device is provided by E. R. Squibb & Sons.
The five plastic parts molded by Plastic Manufacturers, Inc.
meet unique requirements for small components.
Aerodynamic principles of the design call for closely calculated
tolerances in molding and precise finishing. The materials
chosen afford maximum dimensional stability
and the plastic holder is warm and comfortable to the touch.

PM
REG. U.S. PAT. OFF.

PLASTIC MANUFACTURERS
INCORPORATED
STAMFORD CONNECTICUT
INJECTION • TRANSFER & COMPRESSION MOLDING • COMPLETE ASSEMBLY

INDUSTRIAL MOLDING

Cruver is proud of its selection by Motorola Inc. as molder for the two portable model Plastic radio cabinets and the television front shown in the illustration herewith.

CRUVER MFG. CO.

Est. 1896

MOLDING • FABRICATING • LAMINATING • FINISHING
"BAS-RELEEF" • DECORATING • ASSEMBLY • SPRAYING

2460 WEST JACKSON BLVD., CHICAGO 12, ILLINOIS

NEW YORK 2 West 46th Street | DETROIT General Motors Building | ST. LOUIS Cotton Belt Building

SPECIAL DELIVERY *

OUR SERVICE TO YOU is on a "special delivery" basis always. *Your* liquid phenolic resin problem differs from others in the same way your production and marketing objectives are different.

WE CONSIDER that your inquiry and assignment to us calls for "special handling" right from the start. So the *right* phenolic resin for you is always a *special* formulation from us to meet the *special* circumstances you face.

THAT IS THE JOB we have successfully delivered again and again. That is why whenever you write or phone Marblette, you can always count on "special delivery" . . . in a hurry!

MARBLETTE MAKES PRODUCTS MOVE!

Phenolic liquid resins

Resins for casting forming dies and jigs
Heat and acid resistant resins — Metal coating
Wood coating — Bristle setting cement
Bonding resins — Laminating varnish
Low pressure laminating resins
Plastic cements — Insulating varnish

* For special formulations of Liquid Phenolic Resins call or write →

MARBLETTE

37-21 Thirtieth Street · Long Island City, N. Y. · ST 4-8100
CHICAGO · LOS ANGELES · TORONTO · HAVANA

MOSINEE

"More than Paper"

To the plastics industry, MOSINEE stands for paper-base processing materials with scientifically controlled chemical and physical properties, quality and uniformity . . . high tensile and tear strength with high absorptive capacity.

Other technical characteristics are controlled to meet specific plastics production requirements.

MOSINEE PAPER MILLS COMPANY • MOSINEE, WIS.

"Essential Paper Manufacturers"

ASK STOKES

When you want BIG preforms... WHEN YOU WANT small PREFORMS...

... there is a Stokes Preform Press which is perfect for the purpose.

Stokes Preform Presses have been developed through the years to meet the growing demands of the plastics industry.

Simple rugged design assures long trouble-free service at high production rates. You can adjust for pressure, density, weight, and thickness while presses are in operation.

The new Stokes Dual Pressure 294 makes large, heavy preforms up to 4" diameter and 300 grams weight at rates up to 60 per minute. New design produces preforms of uniform density from top to bottom; ideal for preheating and plunger molding. All edges are sharp and firm and free from crumbling. Breakage, damage in handling, and material waste are cut to a minimum.

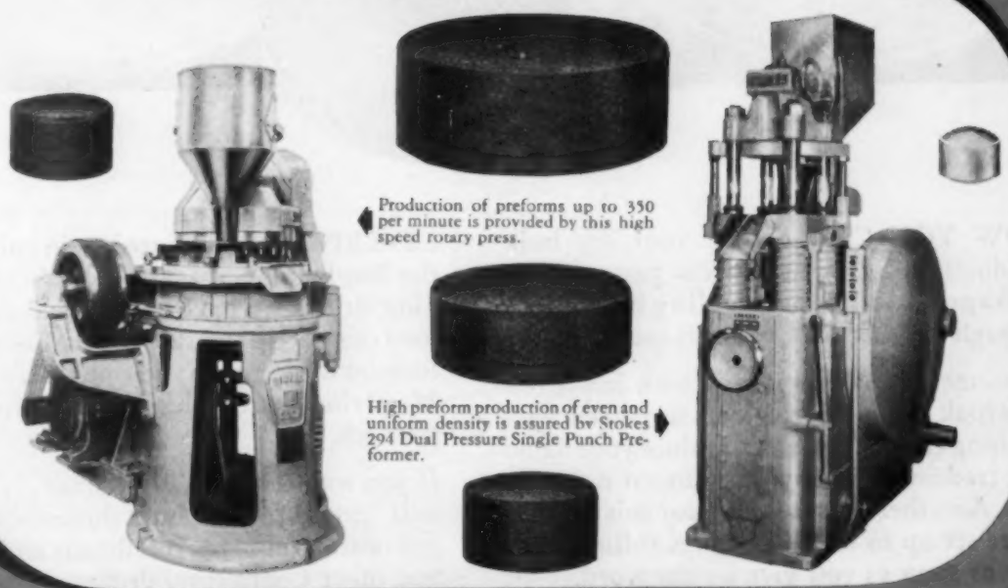
The DDS-2 Rotary is "the old reliable," with years of profitable history in the experience of plastics molders throughout the world. Ball or other standard shaped preforms at rates up to 350 per minute.

These preform presses, shown below, are just two types from the broad range of powerful and economical Stokes presses for every preform need. And Stokes Advisory service meets *all* requirements for information on plastics molding.

F. J. Stokes Machine Company,
5934 Tabor Rd., Phila. 20, Pa.

FJS

Stokes makes Semi-Automatic and Automatic Molding Presses, Plunger Presses, Closure Presses, Preforming Presses, Industrial Tabletting and Powder Metal Presses, Vacuum and Special Processing equipment, Water Stills and Special Machinery.



Production of preforms up to 350 per minute is provided by this high speed rotary press.

High preform production of even and uniform density is assured by Stokes 294 Dual Pressure Single Punch Preformer.

STOKES KNOWS HOW

Dress up your bulk shipments in

Decorated LEVERPAK DRUMS

choice of (17) colors . . . choice of (14) inks

NOW YOU CAN deliver your dry bulk products in style—make them part of your package "family"... traveling billboards through all stages of use and reuse.

Continental can supply you with improved Leverpak drums in any of seventeen eye-catching colors. We can reproduce your name and trademark in any of fourteen different inks. And there's no waiting for this service. We're set up to start the drums rolling your way as soon as you give us the word.

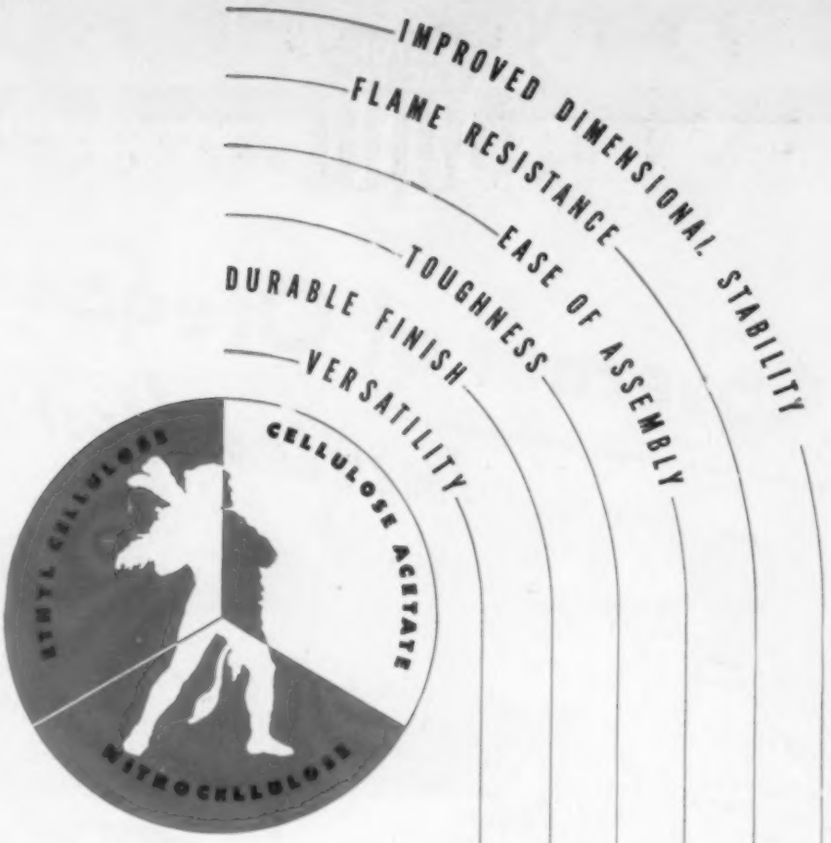
LEVERPAKS—unpainted or in colors—are the best-looking, most serviceable fibre shipping drums we have ever turned out. They load compactly and ride safely. The patented locking device is easy to open, easy to close. Metal chimes are flash butt welded for greater strength.

If you want a sturdier container . . . one that will "dress up" your bulk shipments, contact our nearest office for full details on Leverpak and other Continental drums.

CONTINENTAL CAN COMPANY

Paper Converting Division

VAN WERT • NEW YORK • PHILADELPHIA • PITTSBURGH
TONAWANDA • CLEVELAND • CHICAGO • ST. LOUIS • LOS ANGELES

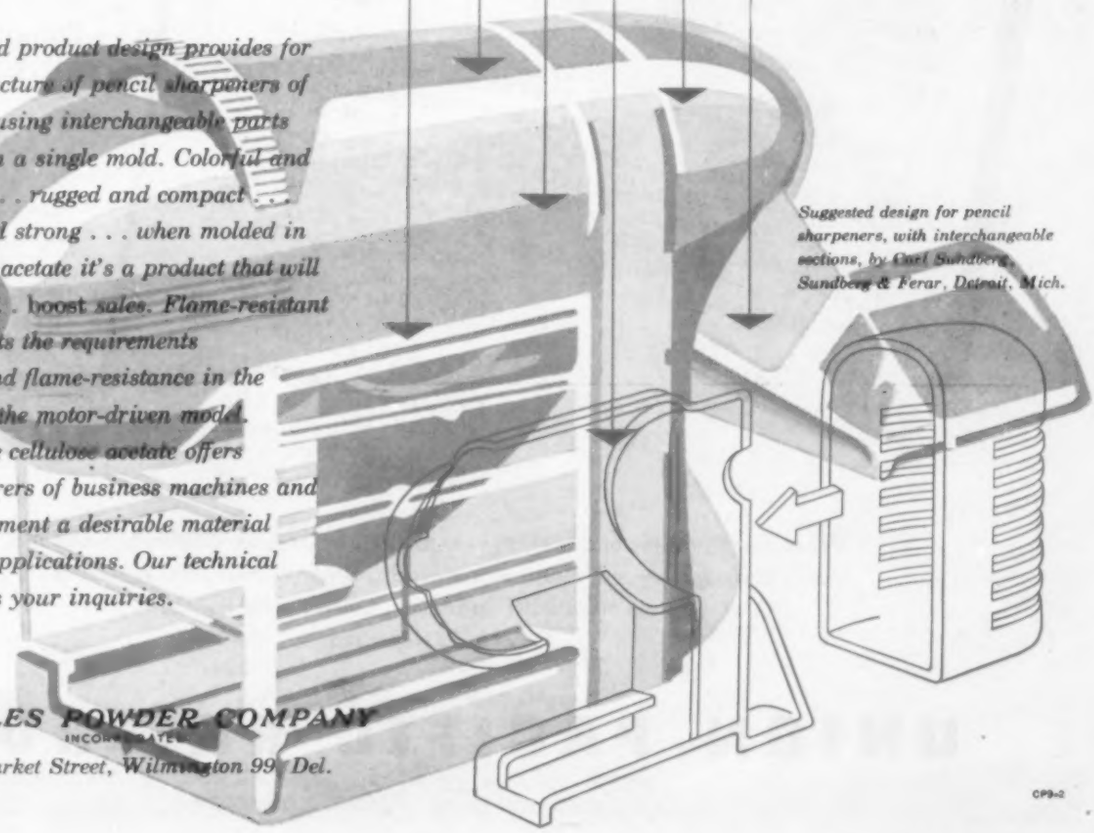


Cellulose Acetate points to profits . . .

in pencil sharpeners or business machines

Here, sound product design provides for the manufacture of pencil sharpeners of two types, using interchangeable parts produced in a single mold. Colorful and attractive . . . rugged and compact . . . durable and strong . . . when molded in high-acetyl acetate it's a product that will cut costs . . . boost sales. Flame-resistant acetate meets the requirements for heat- and flame-resistance in the housing of the motor-driven model.

Versatile cellulose acetate offers manufacturers of business machines and office equipment a desirable material for many applications. Our technical staff invites your inquiries.



Suggested design for pencil sharpeners, with interchangeable sections, by Carl Sundberg, Sundberg & Ferar, Detroit, Mich.

HERCULES POWDER COMPANY
INCORPORATED
916 Market Street, Wilmington 99, Del.

CP9-2

UNION PACIFIC

The Governor of Oregon *invites You*

STATE OF OREGON
EXECUTIVE DEPARTMENT
SALEM

DOUGLAS McKAY
GOVERNOR

To American Industry:

Oregon's industrial payroll has doubled since 1940 and her population has increased 49 per cent. New abundant supplies of America's lowest cost electric power serve Oregon industries and can be increased--up to 1000 per cent more--through the continued development of the Columbia River and its tributaries.

New markets for Oregon made products are expanding year by year. Industrial opportunities here are most attractive to investors requiring safety factors in long period operations.

The rare continuity-of-work record in Oregon's industry and the sane administration of local and state governmental units are not accidental. Labor, business, government and agriculture in Oregon cooperate to assure favorable conditions for new payroll producing industries. Oregon's door is wide open to sound industry and good management.

And Oregon is a great place in which to live!

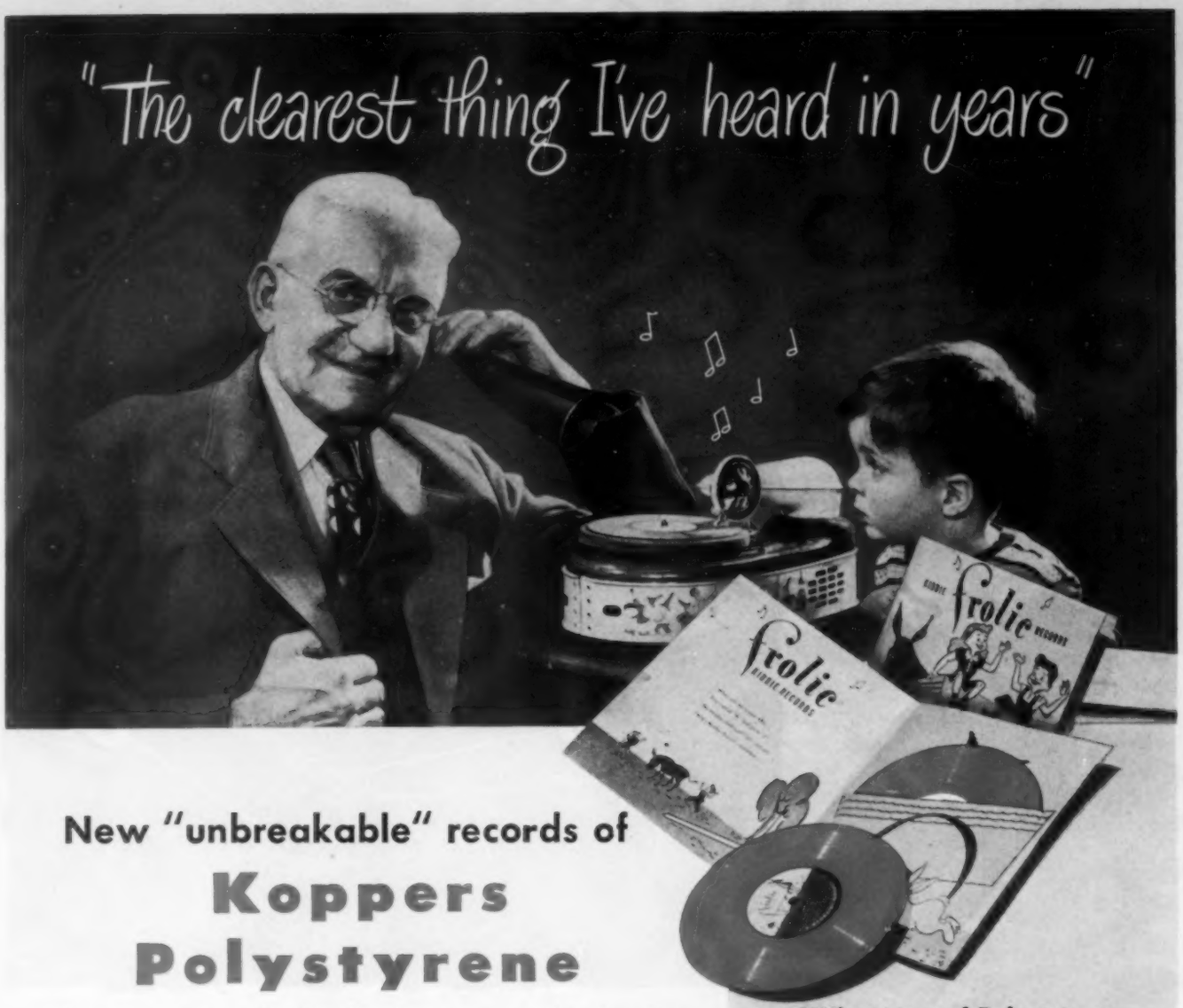
Very truly yours,
Douglas McKay
Governor

Douglas McKay

One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.

When selecting sites and seeking new markets in Oregon, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Utah, Washington, Wyoming . . .
address Industrial Department, Union Pacific Railroad
Omaha 2, Nebraska

UNION PACIFIC RAILROAD
Road of the Streamliners



New "unbreakable" records of

Koppers Polystyrene

have wonderfully improved clarity

● Here's exciting news for everyone who plays, makes, or sells phonograph records. Koppers Polystyrene plastic has proved to be an ideal material for "unbreakable" records. These ideal features of Koppers Polystyrene, according to a successful record maker, are wonderfully improved clarity . . . durability that stands the rigors of child's play . . . and negligible surface noise. What's more, the cost of Koppers Polystyrene is among the lowest of all plastics and it can be made in any color for added sales appeal.

With such an imposing combination of features, Koppers Polystyrene was a "natural" for the *Kiddie Frolic Records* produced by Dillon-Beck Manufacturing Co., Hillside, N. J. Sales of this Wannatoy product ran into such tremendous volume that the molder had difficulty meeting the demand.

KOPPERS COMPANY, INC.
Chemical Division · Pittsburgh 19, Pa.

What type of Polystyrene do you need?

Koppers makes three types of Polystyrene which fit most needs.

Polystyrene 3, the lubricated type for fast, easy molding.

Polystyrene 7, the general-purpose type with 20°F higher heat resistance.

Polystyrene 8, the new high-heat-resistant type that will stand scalding water or the concentrated heat of a radio power tube.

A complete description of all Koppers Perfected Plastics is found in our new booklet. Send for a copy.

KOPPERS COMPANY, INC.
Chemical Division, Dept. MP3
Pittsburgh 19, Pa.

Please send me your new booklet on Koppers Plastics.

Name_____

Company_____

Address_____

KOPPERS

Koppers *Perfected* Plastics

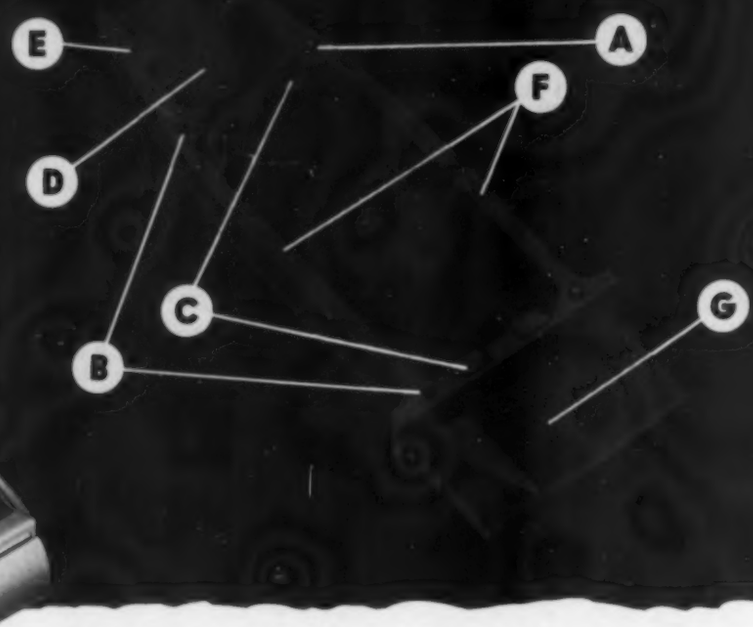
•POLYSTYRENE •ETHYL CELLULOSE •CELLULOSE ACETATE

New Razor *has a Keen Edge on Competition*

The trim, *waterproof* housing, for this new electric wet shaver, the Collins VIBRAZOR, is economically molded and assembled by Aico, for the New Electric Razor Corporation, Baltimore. The manufacturer knew his product would invade a highly competitive field . . . that it would need *every* advantage to insure its success. By expert mold design and material selection, —skillful molding and assembling, —Aico has provided good looks, and durability at *low cost.*

New products are quickly accepted in discriminating markets when Aico experts help plan and produce them. 32 years of molding all plastics by all methods has earned us experience by which *you* can *profit.*

HANDSOME PLASTIC HOUSING DESIGNED FOR *Fast Assembly . . . Speedy Sales*



Selection of ethyl cellulose for this handle was based on its great strength, light weight and electric insulating properties. A mirror-smooth four cavity mold produces up to 3600 pieces a day, shiny and ready for immediate assembly after the gates are removed. Note that the design has been simplified so that all pieces are the same, the projections (A) of one half fitting into holes (B) of another when any two pieces are in perfect register. This speeds accurate assembly. The razor's mechanism is securely supported by shoulders (C) at each end of the larger cavity. Smaller cavity (D) provides space for slack wire. Connecting pins are mounted on a plastic piece held securely in channel (E). Halves are joined together by cementing at surfaces (F) thus insuring a sealed, water-tight and shockproof housing for the driving element. *Magnetic force is exerted* THROUGH *the plastic case itself.* When assembled, the flange extensions (G) make an ideal holder for quick, simple detachment of the razor head.

Strength of the housing has been demonstrated in tests in which the unit has withstood a drop of 10 feet to 15 feet without breakage.

AICO
PRECISION MOLDING
for over 32 years

28 actual applications of Aico molded plastics are shown and fully described in this Portfolio. Send for your copy today and see how plastics can improve the competitive position of *your* products.

AMERICAN INSULATOR CORPORATION
New Freedom, Pennsylvania

MANY THINGS ARE BETTER BECAUSE OF PLASTICS

MODERN PLASTICS

VOLUME 26 MARCH 1949 NUMBER 7

Plasticizers

about which there is more current argument and in which there are more current developments than in any other phase of plastics. The answers are usually in the blending

In no branch of the plastics industry is there so much controversy and divided opinion as there is on the subject of plasticizers. Yet plasticizers were scarcely mentioned in this industry before the war. They were needed, of course, in the vinyl branch of the industry and in cellulosics, but there were few vinyl processors and at that time there were enough plasticizers for cellulosic production. When resin production, particularly vinyl production, increased and when a shortage of proper plasticizers threatened to curtail important applications and resulted in production of less satisfactory compounds, the entire industry awakened to the importance of plasticizers as an essential ingredient in many types of thermoplastics.

The shortage of plasticizers for cellulosics was gradually wiped out after the war. Diethyl and dimethyl phthalate came into sufficient supply to meet demand, and all other plastics except vinyl consumed comparatively small amounts. But the huge demand for vinyl chlorides, which require roughly 1 lb. of plasticizer for every 2 lb. of resin, stimulated research and development to such an extent that they are generally regarded as the major factor in causing an annual plasticizer production spiral that has risen from about 30,000,000 lb. in the late 1930s to an estimated 170,000,000 lb. in 1948.

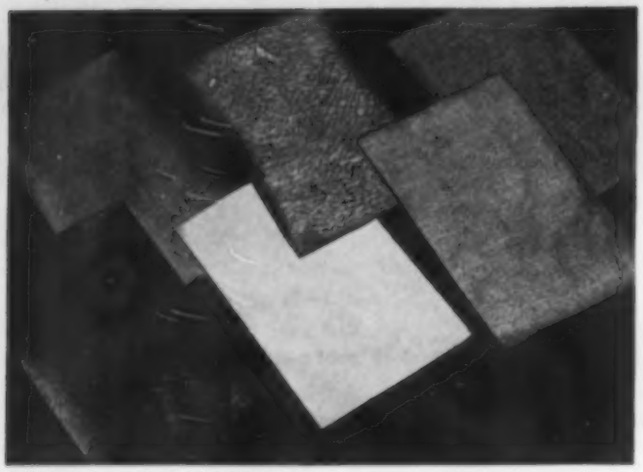
This article will be devoted almost exclusively to the plasticizers used with polyvinyl chloride and copolymers. The subject is far too big for exhaustive treatment, so this will be an attempt to define and classify the various groups, with no effort to explain the actual handling technique. Even with this limitation, we are frank to admit that what is written today may be out of date within a few months, and criticism from many manufacturers and users whose opinions may differ from those expressed here is expected.

There has not been time to test all the claims and counter claims made by competitive agents. Several years must pass before the results of accurate, long-time performance in use tests can be realized. In the meantime new plasticizers are being introduced by the dozen. No one can tell when one or several of them may make many now on the market obsolete.

The importance of plasticizers to vinyl chlorides cannot be over-emphasized. The resins are hard and horny. Except for rigid vinyls, they need another substance to make them workable—a plasticizer. But a plasticizer can be damaging as well as helpful. Selection is all-important. Probably the best known way for a processor to wreck his business is for him to use the wrong plasticizer. The secret of vinyl success is to know how and what to blend

Newly marketed fabric backed vinyl upholstery, Fabrilite has been specially plasticized to avoid spewing or migration

COURTESY E. I. DU PONT DE NEMOURS & CO., INC.



COURTESY B. F. GOODRICH CHEMICAL CO.

Coatings for fabric require plasticizers that contribute maximum amount of suppleness without affecting texture

in order to produce a finished product that has the least possible undesirable properties.

Among the attributes that all plasticizers should possess, paraphrased from a Rohm & Haas bulletin on the subject, are:

Compatability, to obtain a permanent homogenous blend. In other words, they must be materials that will blend with vinyl and stay in the finished goods over long periods of time and in wide temperature variations.

Efficiency, to insure resilience, pliability, low temperature flexibility, and drape with minimum quantities of plasticizer.

Low volatility, to prevent the plasticizer's escape during processing, and to assist in the retention of initial characteristics during the life of the article.

Stability, to prevent degradation of the vinyl resin during heat processing and outdoor exposure.

Other plasticizer properties, less important generally but essential in many uses, include:

Fire resistance.
Water extraction resistance.
Pleasant odor or lack of odor.
Electrical characteristics.
Non-toxicity.
Color.
Oil resistance.

No one plasticizer will give a maximum performance for all these properties. Consequently, plasticizers of various types are generally blended in a compound with the resin to obtain the most desired properties for whatever product is desired. Obviously, electrical properties are not needed in shower curtains or apparel, but light stability is highly important. In wire coating, electrical properties are of primary importance. Hence, a processor may blend according to his need.

There are several different types of plasticizers, but there is considerable overlapping, and any attempt to classify them in particular groups leads to an immediate clash of opinion by plasticizer experts. For a year or two following the war, there was a tendency to break them into groups called liquid, resinous, solid, and extender, but manufacturers are no longer content with any such breakdown.

DOP best-known plasticizer

Almost since the beginning of vinyl processing in this country, dioctyl phthalate, or DOP, has been the best known plasticizer although tricresyl phosphate and Kronisol are said to have been available slightly ahead of it. Today DOP is by far the most widely used from a volume standpoint and is generally considered the plasticizer that will give more all-around properties to a film, sheet, or extruded form than any other. It may be exceeded in any one given property, such as low temperature flexibility, high temperature stability, low volatility, resistance to migration, etc., by other plasticizers, but for a combination of good properties, DOP is hard to beat. The biggest problem until a few months ago was that there wasn't nearly enough to meet demand. The raw materials most needed in DOP production are octyl alcohol and phthalic anhydride.

Tricresyl phosphate (TCP) is probably the second best known, but it, too, was scarce until last Fall. Flame retardance and low volatility are its outstanding properties and have led to its use in wire coating.

TCP also has other good all-around properties, but prejudices were aroused because some grades gave out a noticeable odor and all permitted low temperature cracking. Its relatively low light stability has handicapped its full-scale use in film and sheeting. Small percentages in blends, strangely enough, add to the light stability of other phthalate plasticizers and improve their resistance to embrittlement even though tricresyl by itself is not recommended for light stability. The principal raw materials needed are cresol and phosphorus oxychloride. TCP producers are Monsanto Chemical Co., Celanese Chemical Corp., and Ohio-Apex.

The above plasticizers are referred to by chemists as linear esters, but there are also many other plasticizers of the same chemical construction which may be used alone or blended with DOP or TCP to give low temperature flexibility, and improve hand. Some of the base raw materials used in their manufacture are fatty acids derived from castor oil, palm oil, other vegetable oils, and petroleum compounds. The acids derived from these materials bear such names as ricinoleic, sebacic, caprylic, adipic, azeleaic, and many others. In many cases they are esterified with various types of alcohols to form linear esters and also a second distinctive group of plasticizers called polymeric plasticizers.

In a survey made by Carbide & Carbon Chemicals Corp. in an attempt to come to a mutual understanding on definitions, the favored names for the first group included conventional, liquid, primary, mon-

omeric ester, monomeric plasticizer, simple, monoplast, oligomeric, and ester plasticizer. The second group were dubbed: resinous, polymeric, polyplast, secondary, plastic alloys, polyester plasticizers.

Linear ester type plasticizers

DOP and TCP linear esters have already been mentioned. Dioctyl sebacate, another linear ester type, but derived from fatty acids rather than phthalic anhydride or phosphates, is one of the oldest plasticizers and noted for imparting low temperature flexibility and good hand or feel. Although its volatility is less than many other plasticizers in this group, it is not recommended as a plasticizer to be used alone. It is liquid and monomeric and has many properties similar to DOP, but not quite so many—some better, some not as good. Until recently it was seldom used in lightweight film, but thousands of yards of sheeting have been manufactured from compounds in which it has been used as a part of the plasticizer compound.

In the linear ester group are included not only the three plasticizers named above, but several others that have fair-to-excellent compatability with polyvinyl chloride and its copolymers. Up until recently, only DOP, with the exception of TCP in applications such as wire coating, has been used alone to produce a plasticized composition suitable for many uses. There have been some exceptions but on a small scale. If there had been more DOP available, there would have been less use of many of the other conventional type plasticizers. Only Carbide & Carbon and Ohio-Apex had it for sale in large quantity. The latter company also produces kindred plasticizers, one produced from di-n-octyl phthalate, and another called iso-octyl-phthalate; but the first is higher priced than DOP, and the second has just become available since Enjay Co.'s new iso-octyl alcohol came on the market.

Because of the scarcity of both DOP and TCP; because in some cases other plasticizers were less costly; and because they wanted to improve even the properties given by DOP for some particular applications, most processors and compounders shopped around and experimented with scores of plasticizers which could be used to replace at least part of the DOP necessary in their compounding.

Linear type ester plasticizers have been used to a large extent in this category, not only to cut down on the amount of DOP used in a formulation, but because they contributed definite desirable properties. One among many, in addition to the dioctyl sebacate mentioned earlier, is E. F. Drew Co.'s SC plasticizer, which is mentioned here because it was among the first. It is a prime example of a fatty acid derived plasticizer which is used to give more flexibility and drape but will migrate to some extent unless locked in the finished vinyl sheet with some other plasticizer such as DOP. SC is frequently used on a half and half basis with DOP. Among the newer plasticizers of the oil group based on azelaic or oleic type rather than sebacic are Emery Industries' Plastoleins, which are advertised as of low volatility, high water resistance, and imparting low temperature flexibility, good elongation, and high tensile strength to film.

Still another different plasticizer of the linear ester type is that manufactured by Chas. Pfizer & Co. It is acetyl trihexyl citrate derived from citric acid esters and intended primarily for vinyl film used in food packaging, although it looks promising for use with other types of vinyl products. It compares to DOP in volatility and compatability.

Another plasticizer produced by the same company and derived from aconitic acid is particularly recommended by the producer for its stabilizing property when used with vinyls. These Pfizer plasticizers are comparatively new in the industry and are based essentially on sugar. They are currently high priced, but it is expected that planned large-scale production will result in a price situation that will make them economical for use in many specialty applications.

There are many other materials that might be grouped under this heading of "conventional", solvent, or migrating plasticizers, all of them noted for their low molecular weight or low viscosity which makes them pour easily. An example of a low cost one is Barrett's Plasticizer 50B, which is promoted as a general purpose plasticizer. It is a phthalate type but considerably different than straight dibutyl

Floor tile uses a large percentage of filler but the plasticized vinyl portion must be blended to give a tough surface

COURTESY B. F. GOODRICH CHEMICAL CO.

phthalate and currently sells for several cents less than DOP. Its properties are frankly admitted as slightly below DOP, but there are many applications where the user can substitute it for not more than one-third of the DOP used in his compound and produce a satisfactory product.

Although many of these materials have been used with DOP for economical reasons and to make it go farther, some contribute particular properties. Thus, diclohexyl phthalate, which is only a bit less costly than DOP, is used primarily for cellophane but occasionally in vinyls to give very hard surfaces.

Economical phthalate type plasticizers which cost about 6¢ less than DOP and improve processing characteristics are the above mentioned Barrett's Plasticizer 50B and Monsanto's Santicizer 160. While more volatile than DOP, they offer some advantages in addition to processing action, such as good tensile and tear strength and oil resistance. They are generally used at approximately one-third of the plasticizer formulation.

Other specialties are Monsanto's Santicizer B16 and 140. The first is a non-toxic, tasteless phthalate plasticizer used in such applications as beer and milk tubings. It is slightly higher in cost than TCP. Santicizer 140 (cresyl diphenyl phosphate) is comparable to TCP in price but is claimed to possess better low temperature flexibility and slightly better light stability. Like most phosphate plasticizers, it is flame retardant.

Monsanto's newest plasticizer designed to compete with DOP is Santicizer 141. It is an alkyl aryl phosphate which is claimed to be non-toxic and to combine, in one plasticizer, low temperature flexibility, low volatility, flame resistance, good light stability, and resistance to embrittlement from outdoor exposure. It possesses strong solvent action which enables increased production rates or the fabrication of high chloride vinyl resins at lower temperatures. It is priced competitively with DOP. The company is so convinced of its all-around utility that it has built a new 10,000,000-lb. capacity plant to produce it.

Another plasticizer, which, like tricresyl, has many all-around properties and is recommended particularly for flame resistance is Dow's #5 which, it is claimed, has no odor. Originally a tailor-made resin for ethyl cellulose and derived partially from ortho phenyl phenol, it is a low cost plasticizer (37¢), practically colorless, and adaptable for vinyl film and sheeting where color, lack of odor, or electrical properties are important. A new Dow plasticizer #55 is a technical grade of #5 that has a faint phenolic odor and a straw color but performs very well in all applications except when strict color or odor requirements are necessary. It is particularly adaptable for wire coating and is desirable because of low price—35¢ a pound.

To digress a bit from conventional plasticizers, simply because the Dow plasticizers are grouped together, an entirely different plasticizer derived from styrene should be mentioned. It is a high viscosity liquid, colorless, polymeric, heat and light stable, particularly suitable for wire coating and floor tile. Called Dow Resin 276 V2, it can be used in film and sheet but must be used in combination with ester type plasticizers because of low solvency for vinyl; nevertheless, it is useful as an extender in small quantities since at 24¢ a lb. it helps to lower cost.

Polymeric plasticizers

The second class of plasticizers has been called polymeric by Rohm & Haas whose Resinous Products Div. was a pioneer developer. The company points out that the polymerics are not as efficient as monomeric compounds in plasticizing vinyl compounds, but they are outstanding in permanence and non-migratability and provide resistance qualities not obtainable with monomeric plasticizers.

The volatility of these resinous polymeric modifiers is extremely low; their extractibility by water, mineral oil, and 100 octane gasoline is very small when compared to the linear ester types. Their resistance to ultra-violet exposure is high. They are much more viscous than conventional plasticizers although Rohm & Haas' newest plasticizer, Paraplex G-50, is claimed to possess the outstanding properties of the more viscous resin plasticizers with much lower viscosity and to be more easily worked into the compound. Furthermore, G-50 sells at 39½¢ in comparison to the company's older polymeric plasticizers which sell at 43 and 76 cents. G-50 is the result of research to make a resinous polymeric that has more of the handling characteristics of a monomeric plasticizer, combined with very low volatility, resistance to extraction, and other permanent characteristics of the polymeric type. These plasticizers have big molecules rather than small and once incorporated in a finished piece of goods, they can't slide out as easily as the smaller molecules of migrating type plasticizers.

Other companies are now introducing these polymeric compounds. One of the Plastoleins by Emery, and General Electric's Glyptal 2557, as well as Carbide & Carbon's Flexol R-1, are examples.

Among other polymerics is one manufactured by Chas. Pfizer & Co. from itaconic acid, a material fermented from sugar. It is currently in development stages only, but tests indicate that it has all the attributes of permanence.

Low cost extenders

Still another type of plasticizers is loosely classified as extenders. There are many plasticizers used as extenders in the industry, but broadly speaking the term is generally associated with petroleum derivatives such as Dutrex and Sovaloid, produced

At room temperature, samples of vinyl resin containing three different kinds of plasticizer have practically the same flexibility

ALL PHOTOS COURTESY BAKELITE CORP.

At —40° C., samples similar to those at left above emphasize the difference in low temperature flexibility imparted by similar quantities of various plasticizers

Samples of vinyl resin plasticized with low and high type volatile plasticizers. After oven aging and soaking in water for two weeks, left sample still drapes; center piece is stiff; right sample is rigid, has no ability to drape, no "hand"

respectively by Shell Oil Co. and Socony-Vacuum Oil Co. They are low cost and intended primarily to make conventional plasticizers go farther. Some of these extenders are not particularly recommended for light nor heat stability, nor for low temperature flexibility; but there are applications, such as work gloves or certain types of wire coating, where they can be satisfactorily employed as a part of the plasticizing compound. The price, at well below 10¢ a lb., is attractive.

Improvements deemed necessary

The point to remember is that DOP, a conventional plasticizer, today represents perhaps the highest point in plasticizer perfection so far attained in all around properties, including cost; but the chemists and technologists are convinced that improvements are necessary.

There are several faults of DOP and similar type plasticizers that can be improved. All linear ester plasticizers tend to come to the surface so that they may be rubbed off under such treatment as that received by the upholstery of a truck seat. In other cases they may mar a lacquered desk because of solvent action. For these reasons, the permanence of polymeric or polyester plasticizers is desirable.

By combining linear esters with polymeric plasticizers, the ultimate in desirable properties may be obtained. But the blending of all types of plasticizers must be done cautiously lest the weaker properties

of one overbalance the stronger properties of another. Blending of plasticizers to get the desired result at the lowest possible cost is an art that can only be acquired by experience.

Perhaps the situation is best summed up by taking a look at what Carbide & Carbon is doing. As the largest producer of DOP, it would seem to be in an enviable position; but in addition to DOP, it also produces a linear ester called Flexol 4GO which is lower in cost and is recommended for use with DOP to help low temperature flexibility. It also has a resinous plasticizer Flexol R-1 which may be added to DOP to improve heat stability for such things as electrical insulation or in curtains that might be used over a radiator. Of more significance is its new Flexol TWS which is in direct competition with DOP and sold at a lower price, viz. 40½¢ compared to 43. Flexol TWS is said to be unique in structure, less volatile than tricresyl which is the industry measuring stick for volatility, and laboratory tests indicate that it will have good heat stability. Production started last Summer, and the plasticizer was used mostly in extrusions and floor coverings. Experiments with film are now under way. It is reported to have made possible an increase of extrusion speed for such things as window channeling and fender welts for automobiles.

Nitrile rubber blends

Another plasticizer not mentioned above but certainly of growing importance is the solid type—generally nitrile rubber. A notable example is the extruded oleomargarine wrapper which is a vinyl plasticized with nitrile rubber. Fabricators are enthusiastic about the possibilities of a nitrile rubber plasticizer because there is no danger of its exuding or migrating. Processors have complained that it is difficult to work in nitrile rubber as a plasticizer, but B. F. Goodrich Chemical Co. asserts that its new EP Hycar rubbers have permitted easy processing and furthermore that Geon polyblend also has eliminated this problem since the nitrile rubber is already dispersed in the vinyl phase. A 2-mil polyblend film is now being experimentally calendered and extruded. The percentage of vinyl to rubber in this compound might be 70 to 30 in powder form in comparison to the standard 55 vinyl parts to 45 nitrile rubber in slab form. The 70 to 30 ratio was devised to obtain more versatile mixing and incidentally a tougher film. It would be unsuitable for curtains but good for packaging.

In ordinary translucent or transparent lightweight film where clarity is necessary, a nitrile rubber plasticizer might present color problems but when properly compounded it has been successfully used with good color effects. When greater flexibility or ease in working is needed, from 5 to 10% of a liquid plasticizer may be added to the 55-45 vinyl-nitrile rubber compound, and the rubber seems to seal it in so there is reduced danger of migration.

In the polyblend types, the compound is furnished, by the producer, already plasticized with Hycar nitrile rubber, but a processor may do his own compounding by buying the vinyl and Hycar separately or by purchasing Perbunan, the Enjay Co.'s straight nitrile rubber. The nitriles are used in various percentages according to the end product desired.

The aging quality is a problem that must be overcome before rubber plasticizers become more popular, and the solution seems to hinge upon development of a better stabilizer. That will come in time.

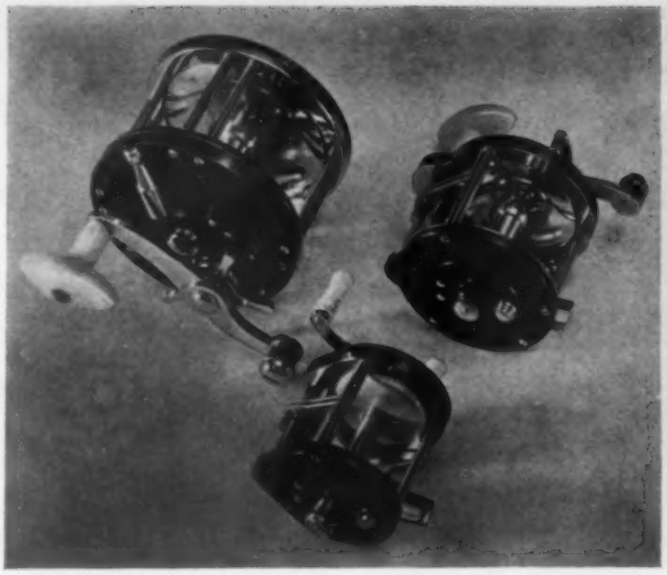
Even so, such things as vinyl-nitrile rubber floor coverings, light fabric coatings for card tables, heavy duty upholstery, wire coating, are on the market. That the color problem is by no means unsolvable seems assured since pure white shower curtains made from straight Hycar have been exhibited.

Among the manufacturers who advertise plasticizers of the type discussed in this article are: Baker Castor Oil Co.; Barrett Div., The Allied Chemical & Dye Corp.; Carbide & Carbon Chemicals Corp.; Celanese Chemical Corp.; Dow Chemical Co.; E. F. Drew & Co., Inc., Emery Industries Inc.; Enjay Co., Inc.; General Electric Co.; B. F. Goodrich Chemical Co.; Hardesty Chemical Co., Inc.; Hercules Powder Co.; Heribert, Inc.; Monsanto Chemical Co.; Ohio-Apex, Inc.; Chas Pfizer & Co.; Rohm & Haas Co.; Shell Oil Co., Inc.; Socony-Vacuum Oil Co., Inc.; Witco Chemical Co.

The supply situation for plasticizers has changed considerably over the past six months from one of scarcity to easy availability. The reasons for this situation will be discussed in the next issue of MODERN PLASTICS.

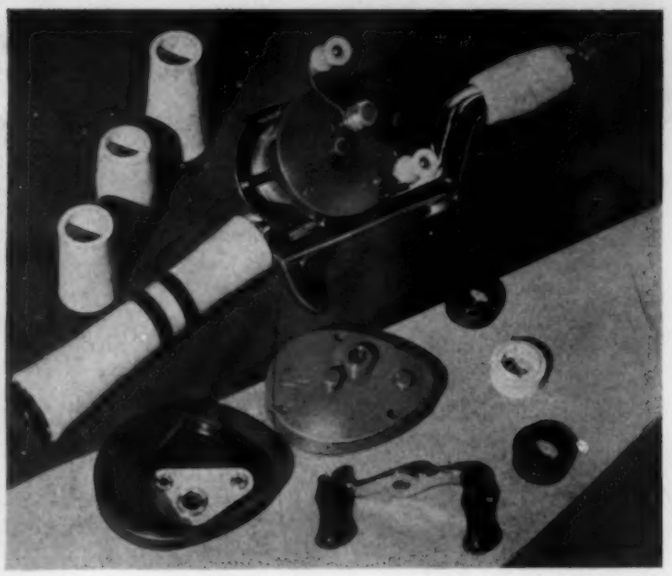
Collar liners, a specialty vinyl application, must be plasticized to give qualities such as flexibility and density

COURTESY B. F. GOODRICH CHEMICAL CO.



COURTESY DUREZ PLASTICS & CHEMICALS CO.

Reels for salt water fishing have phenolic end plates and spools, thermoplastic handles, to give lightness and corrosion resistance



COURTESY HERCULES POWDER CO.

Casting rod and reel have handles and gear box made of cellulose acetate. Rod handle has six plastic pieces; reel, three plastic parts

Piscatorial Plastics

Some thermosets and practically all thermoplastics are molded or fabricated to produce fishing tackle for a multi-million market of anglers

OVER 19,000,000 men bought fresh-water fishing licenses in 1948; millions more were either salt-water fishermen or ducked the wardens and got by without licenses. In the pursuit of big ones to be eaten or stuffed—but never lied about—these men use rods, reels, lures, and innumerable accessories containing huge quantities of plastics in the aggregate.

The invasion of the fishing tackle field by plastics has been going on for over 15 years. Phenolic end-plates for reels were introduced at least that long ago. But the big and general use of plastics has come only in the last two years. Of the thermoset materials, only phenolics find any general use in fishing tackle, chiefly in molded reel components and as laminating resins in wooden rods. Every thermoplastic, however, is used to some extent. Cellulose acetate butyrate obviously dominates the field, as the color plates on pages 63 and 64 show. The affinity of butyrate for lacquers makes it widely used for lures.

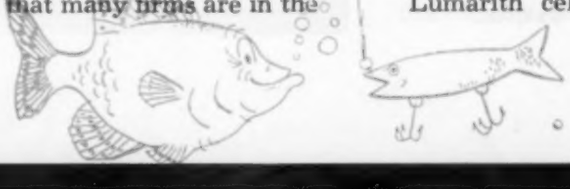
MODERN PLASTICS' list of fishing tackle makers who use considerable quantities of plastics contains 87 names. Probably twice that many firms are in the business. Any complete coverage of all of the applications of plastics in this far flung segment of the industry would be impossible in a single magazine article. It will, however, point up the diversity of plastics applications and will indicate their scope if a number of examples are presented of the functional use of different plastics materials in angling equipment.

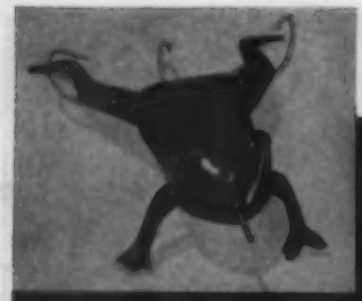
Plastics in reel parts

One of the big companies in the tackle business is Ocean City Manufacturing Co. The company uses a lot of phenolics in reel end-plates and spools, especially for salt water fishing. Outstanding jobs in its present line were molded by the Plastics Div., General Electric Co., Pittsfield, Mass., and August C. Frank Co., Philadelphia, Pa. Three of the reels with components molded of Durez phenolic by Frank are illustrated above, at left.

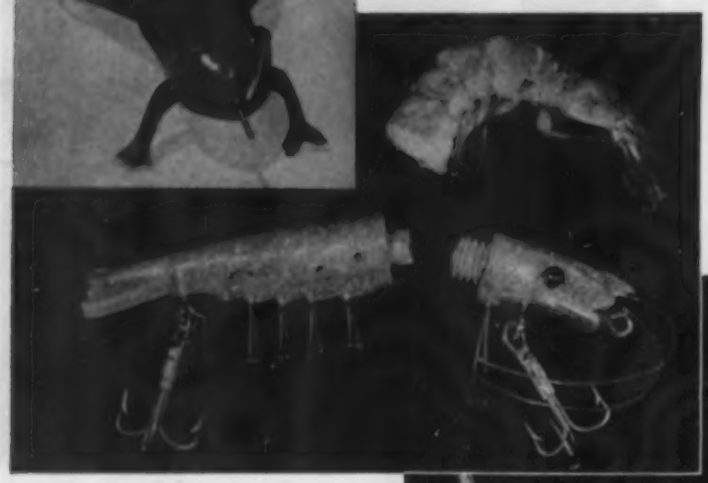
Another big maker, Penn Fishing Tackle Mfg. Co., uses Bakelite and Resinox phenolics in molding its own reel components. Penn reels have plastic spools and end-plates reinforced with metal rings.

Lumarith cellulose acetate is used by Detroit





The Halik frog, with butyrate body and rubber legs, weighs ⅜ ounce. In action it simulates the kicking motion of a swimming frog. This lure is carefully colored by hand



Shrimp lure, most realistic, looks, tastes, smells, and acts like shrimp because polystyrene two-part body is filled with shrimp meat and pink body has saran legs and feelers

COURTESY TENNESSEE EASTMAN CORP.

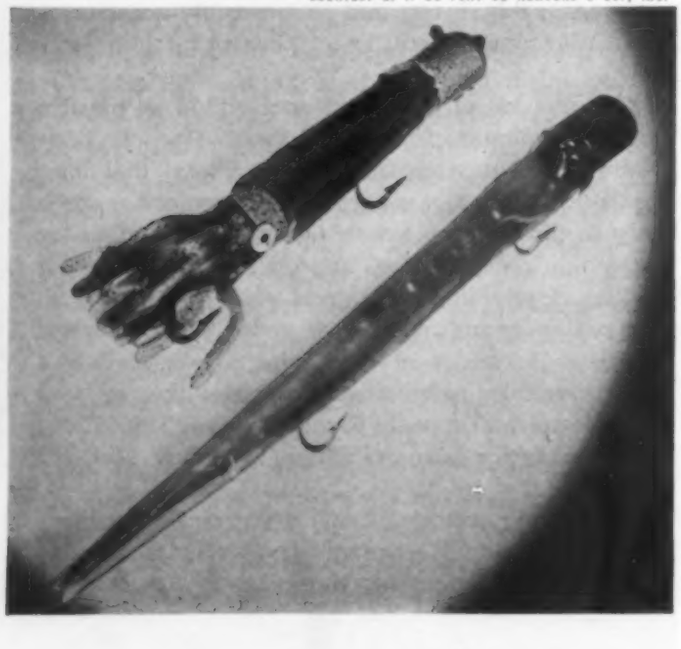
At right the Fliko bait which has a rotating spiral core and a swishing tail movement. Next the Vee-Bug and Curv-A-Lure. At far right, two bubble lures with plastic bodies, metal trim. Butyrate is used in all of these lures

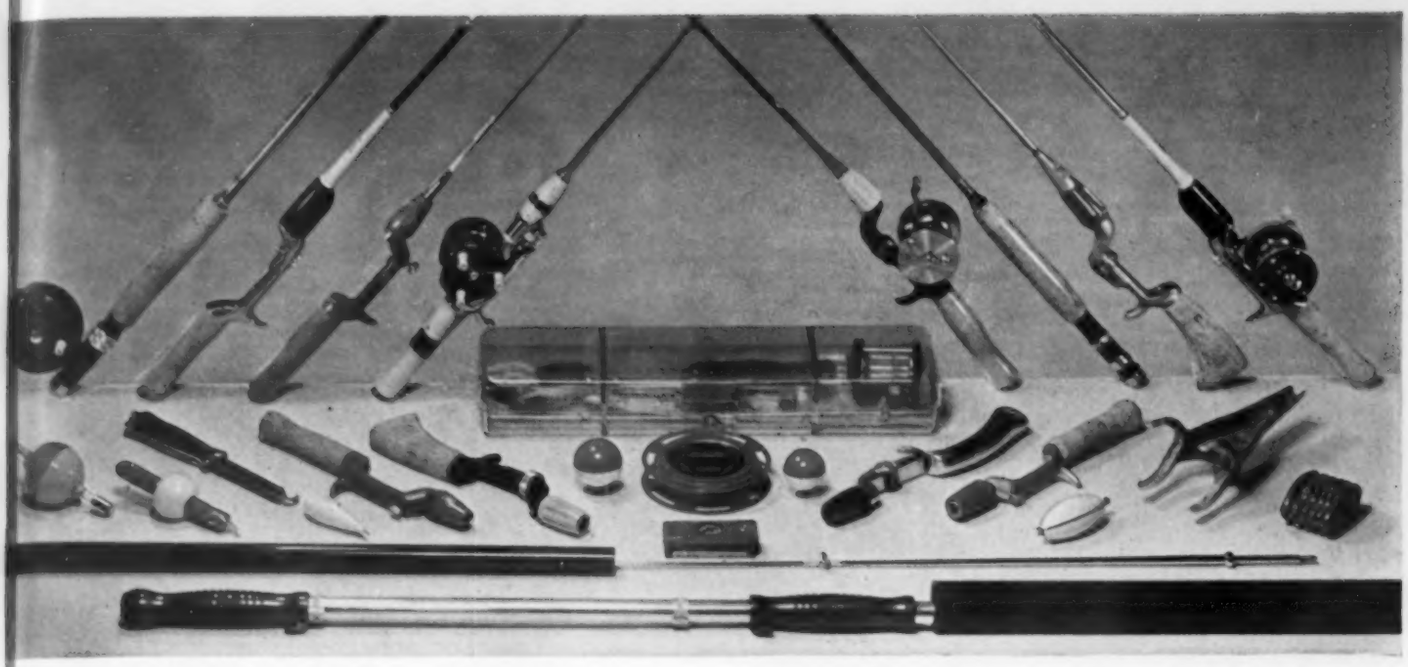
COURTESY THE NEW JERSEY ZINC CO.

Polyvinyl chloride, pigmented with luminescent compound, is used in manufacture of glowing worms, spinners, tails, heads, and even eggs. The elastomeric material also permits scenting so that the lure will smell like pork, etc.

Extruded polyethylene sheet is fabricated into squid and eel lures, weighted by metal and colored to simulate real thing

COURTESY E. I. DU PONT DE NEMOURS & CO., INC.

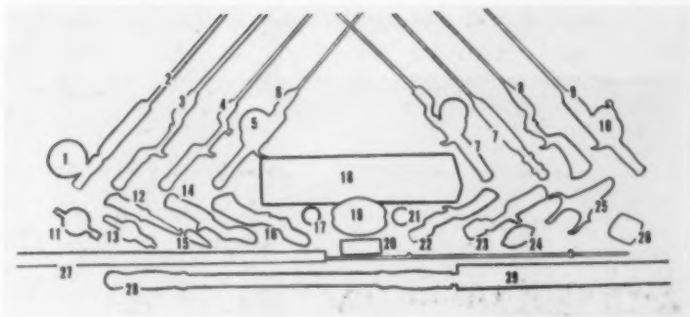




COLOR PLATES COURTESY TENNESSEE EASTMAN CORP.

Names of manufacturers and molders of fishing equipment shown above are listed below, keyed to drawing at right. Tenite II cellulose acetate butyrate is the plastic used.

1 — Lite Mfg. Co.; molder, National Products Co., Kansas City, Mo. 2, 7 — Horrocks Ibbotson Co.; molder, Horrocks Ibbotson Co., Utica, N. Y. 3, 9 — Horton Mfg. Co.; molder, Chicago Molded Products Co., Chicago, Ill. 4, 14, and 23 — American Fork and Hoe Co.; molder, not available. 5 — Aerocast Products; molder, Ger-Ell Mfg. Co., Chicago. 6 — Orchard Industries, Inc.; molder, Detroit Plastic Eng. Co., Base Line, Mich. 8, 16 — Gephart Mfg. Co.; molder, Gits Molding Corp., Chicago. 10 — Shakespeare Co.; molder, Michigan Molded Plastics, Dexter, Mich. 11 — Coughlin Specialties; molder, Franklin Plastics Co., Franklin, Pa. 12 — Waltco Products; molder, Neo Products Co., Chicago. 13 — W. J. Jamison Co.; molder, Lusteroid Container, South Orange, N. J. 15 — P & K Inc.; molder, Rada Products Co., Chicago. 17, 21 — Dayton Bait Co.; molder, Buckeye Molding Co., Dayton, Ohio. 18 — Ocean City Mfg. Co.; molder, Worcester Moulded Plastics Co., Worcester, Mass. 19 — Sunset Line & Twine Co.; molder, American Molding Co., San Francisco, Calif. 20 — P & K Inc.; molder, American Molded Products, Chicago. 22 — Waltco Products; molder, Neo Products Co., Chicago. 24 — Namco Mfg. Co.; molder, Wenco Mfg. Co., St. Paul, Minn. 25 — Allegheny Mold & Die Co.; molder, Precision Molded Plastics, Cleveland, Ohio. 26 — Paulson Brothers; molder, Grant and Rath Plastics, Inc., Portland, Ore. 27, 29 — Extruded Plastics, Inc.; rod cases of Tulox tubing. 28 — South Bend Automatic, Inc.; molder, Niles Corp., South Bend, Ind.



Plastic Engineering Co., Base Line, Mich., in its Water King line of matched rods and reels, as shown in photo at upper right, page 61.

A good example of a butyrate application in reels is the level winding reel made by Ranger, Inc. The plastic parts are molded by Michigan Plastic Products Co., Grand Haven, Mich. The Tenite II caps are molded over bronze bearings in which the stainless steel rotating parts revolve.

Alluring plastic lures

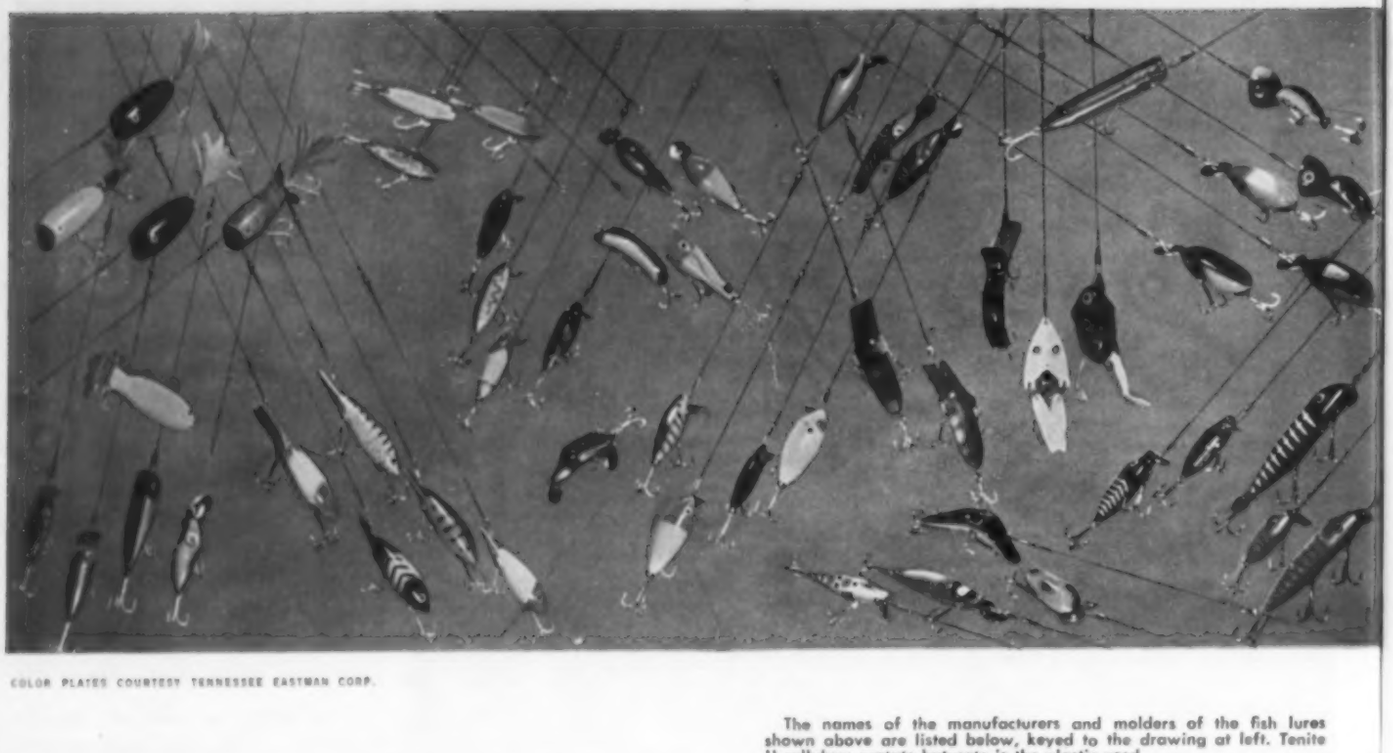
It is a moot point whether the generous use of color and mechanical gimmicks in fish lures is of most interest to fish or to fishermen. In any case plastic lures sell well — and catch fish. Without plastics the variety of color and action in lures wouldn't be possible. With plastics, lures are made that wiggle, jump, dive, blow bubbles, whistle, light up in the dark, and emulate in appearance and action all probable prey of all varieties of fish—no matter how finicky in diet.

If the fish likes shrimp he may go for a lure made by Manning's Tasty Shrimp Lure Co., Inc. The device is molded of pink Lustron polystyrene in two parts, and is actually a vial with holes in the sides. Push in some real shrimp meat, screw on the head, and the lure looks, smells, and tastes like shrimp. Legs and antenna are of saran monofilament.

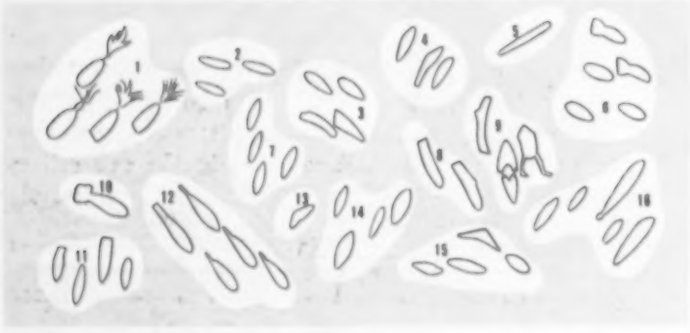
Would your finny friend prefer a frog? Then try the lure made by The Halik Co. Weighing ⅜ oz., it has a body of Tenite II and rubber legs which kick when the lure is jerked through the water. Molds for the job were made by General Tool Co., St. Paul, Minn. Molding was done by Minnesota Plastics Corp., St. Paul.

Bubble Minnie and Bubble Sally are two new lures by Fair Play Industries. Acetate and butyrate parts, molded by Merico Co., Detroit, incorporate capsules in which bubble-making tablets are placed. Another bubbler is the Aqua-Bat molded of hard-flow Lumarith by Culerk Corp., Flanders, N. J., for F. S. Burroughs & Co.

The Holden Line Co. offers the Circle H line of related lures, molded of polystyrene by Atlantic Plastic and Metal Parts Co., Cleveland, Ohio. The



COLOR PLATES COURTESY TENNESSEE EASTMAN CORP.



The names of the manufacturers and molders of the fish lures shown above are listed below, keyed to the drawing at left. Tenite II cellulose acetate butyrate is the plastic used.

1 — Tony Accetta & Son; molder, Nasco Plastics Div., National Organ Supply Co.; Erie, Pa. 2 — Shakespeare Co.; molders, Cruver Mfg. Co., Chicago, Ill.; Plastics Div., Continental Can Co., Cambridge, Ohio; Michigan Molded Plastics, Dexter, Mich. 3 — P & K Inc.; molder, Rada Products Co., Chicago. 4 — Paul Bunyan Bait Co.; molder, Minnesota Plastics Corp., St. Paul, Minn. 5 — Rice Engineering Co.; molder, not available. 6 — Orchard Industries, Inc.; molder, Orchard Industries, Inc., Detroit, Mich. 7 — South Bend Bait Co.; molder, Sobenite, Inc., South Bend, Ind. 8 — Mercoy Tackle Co.; molder, Peerless Molded Plastics, Toledo, Ohio. 9 — Shurebite Mfg. Co.; molder, Sobenite, Inc., South Bend, Ind. 10 — Ecksi-Lure Mfg. Co.; molder, Mutual Plastic Mold Co., South Gate, Calif. 11 — James Heddon's Sons; molder, not available. 12 — Bomber Bait Co.; molder, Bomber Bait Co., Gainesville, Tex. 13 — W. J. Jamison Co.; molder, not available. 14 — American Fork and Hoe Co.; molder, Columbus Plastic Products Co., Columbus, Ohio. 15 — Millsite Tackle Co.; molder, Millsite Tackle Co., Howell, Mich. 16 — Fred Rinehart Tackle Co.; molders, Columbus Plastic Products Co., Columbus, Ohio, and Ajax Plastics, Inc., Cambridge, Ohio.

hollow halves of the lures are lacquered on the inside, the plastic acting to produce a sparkling effect in the water.

Glo-Lure Co. and Porko Baits, Inc., Chicago, Ill., specialize in luminous lures. Porko compounds Geon 100-X-210 polyvinyl chloride resin with dioctyl phthalate plasticizer and a stabilizer plus pigment made by The New Jersey Zinc Co., New York, N. Y., and molds it into glow worms, spinners, and wobblers that light up in the dark. The company even scents one of these luminous plastic lures to smell like pork for luring fish that want a pork diet along with their night life.

Nitron cellulose nitrate sheet into which sparkling ground glass has been laminated is fabricated into deep trolling spinners by Fishmaster Sporting Goods Co., Wollaston, Mass. Fishmaster also uses polystyrene in lures and puts out an 8-oz. landing net with an acrylic frame and a braided nylon bag.

Polyethylene, lightest of plastics, floats. It is featured in the Eel Skinn and Squidd lures made from Du Pont Polythene by Bradford Tackle Co., Providence, R. I. These baits, which never become rancid and need no special care, are fabricated from film made by Plax Corp., Hartford, Conn., and are colored and decorated with special paints.

Crimped white nylon monofilament 0.006 in. thick is used by Roessler Corp., Philadelphia, in making feather jig lures in 33 different styles and weights. They are designed especially for deep-sea and other salt water fishing.

Plastic floats in wide variety

Floats for nets, for casting, and for still-fishing are made from plastics as standard practice today. Among casting floats, Ed. Lane & Co., Inc., Wyoming, N. Y., molds and markets a self-adjusting model of Tenite cellulose acetate.

For night fishing, Bober-Lite Mfg. Co., Racine, Wis., offers a Lustron float within which has been sealed a tiny light bulb and battery. When the fish bites, the pull on the line causes the plastic float to light up.

Rods of glass and polyesters

Shakespeare Co., Kalamazoo, Mich., The Fairfax Engineering Co., Inc., Kansas City, Kan., and Southwester Co., Chicago, Ill., all manufacture fishing

rods from glass fibers and polyester resins, taking advantage of the tensile strength of glass (400,000 p.s.i. of fibers) and balancing the modulus of elasticity of the glass with the plastic. Fairfax also makes rod cases of glass cloth and resin.

Traps are plastics, too

Crabs, minnows, and other live baits are now caught with the aid of plastics. The new Minotrapper is discussed as a molding and design job on page 66 of this issue. Sheet cellulose nitrate by Nixon Nitration Works is fabricated by Cully's Minnow Hatchery, Minaequa, Wis., into a transparent minnow trap, portable and easily cleaned.

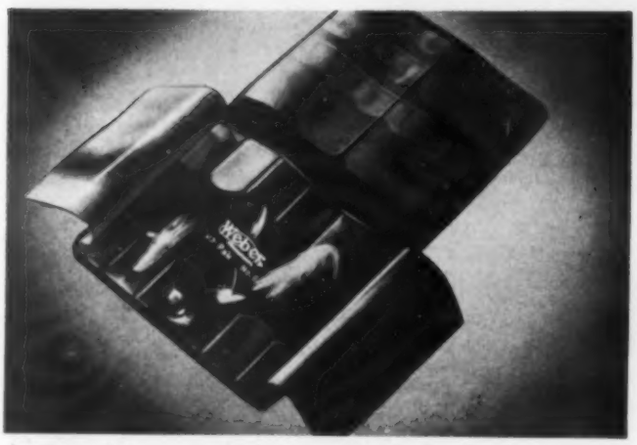
A bait container for a crab trap is molded from Tenite II by Plastal Specialties Co., Seattle, Wash., for Plasticrab Bait Co. Costing very little more than wooden bait containers which deteriorate in a few months, these units last several seasons. They have the additional advantage of transparency.

Tackle boxes and packages

Latest Ocean City use of plastics is in fishing kit boxes molded from crystal clear Tenite II by

New tackle box for junior fishing kit is molded in two parts in one shot (bottom). Boxes are either 16 or 20 in. in length

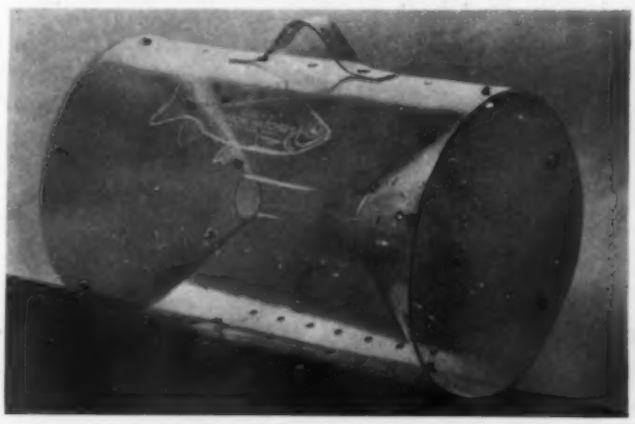
Fly-Tainer is fabricated from vinyl, looks like good leather. Parts are die-cut and electronically sealed on metal jigs



COURTESY BAKELITE CORP.

Phenolic line holder which locks by slight twist of the wrist has transparent polystyrene cover, making a package

Sheet cellulose nitrate is used with metal bolt fasteners to make this transparent minnow trap. It is portable and easily cleaned



Drawstring fish bag made of woven saran is corrosion-proof, sag-proof, and so strong it will hold 30 lb. of fish readily

COURTESY CHICOPEE SALES CORP.

Worcester Moulded Plastics Co., Worcester, Mass. These kits used to be put up in printed cardboard containers, but dealers found it necessary to open the boxes in order to sell them. The plastic boxes, with top and bottom molded in one shot and available in two sizes, 20 in. and 16 in long, make for better merchandising and can be used as permanent containers.

Cortland Line Co. Inc. combines three plastics in a new offering. Nylon line is wound on a Bakelite phenolic form which becomes a transfer reel when the transparent Bakelite polystyrene cover is removed. Molding is by Northern Industrial Chemical Co., South Boston, Mass. Both Sunset Line & Twine Co., San Francisco, Calif., and Rain-Beau Products Co., Canton, Mass., are using polystyrene spools for their fishing line packages; Sunset also employs butyrate in one type of spool.

Compartmented fly boxes are molded from nearly all rigid transparent thermoplastics and are fabricated from sheet acetate. A new angle however (no pun intended) is in the Fly-Tainer fabricated from Vinylite by Angler's Products Co., Elmhurst, N. Y. This product is in effect a fine wallet, looking like calfskin. Each fly is held in its own transparent packet, safe yet easy to take out. Extra pockets are provided for storing leaders, license, etc. The components are die-cut to size and electronically welded by the use of raised-edge dies of extremely close tolerance.

A new leader material

Nylon fishing lines are not new, but are reaching a new stage of perfection and a new availability in variety. Really new, though, is the Steelon leader sold by Berkley Fly Co. It consists of a seven-strand stainless steel cable wire with a solid nylon coating extruded by Danielson Mfg. Co., Danielson, Conn. It has low visibility in the water plus high resistance to kinking. It is rust- and corrosion-proof and cannot be cut by the fish's teeth.

And after they're caught, fish have to be carried. So Bertley Co., Pompton Lakes, N. J., makes a drawstring fish bag of Lumite woven mesh—saran monofilament. The plastic bag is strain-proof, sag-proof, abuse-proof, and chemically inert.

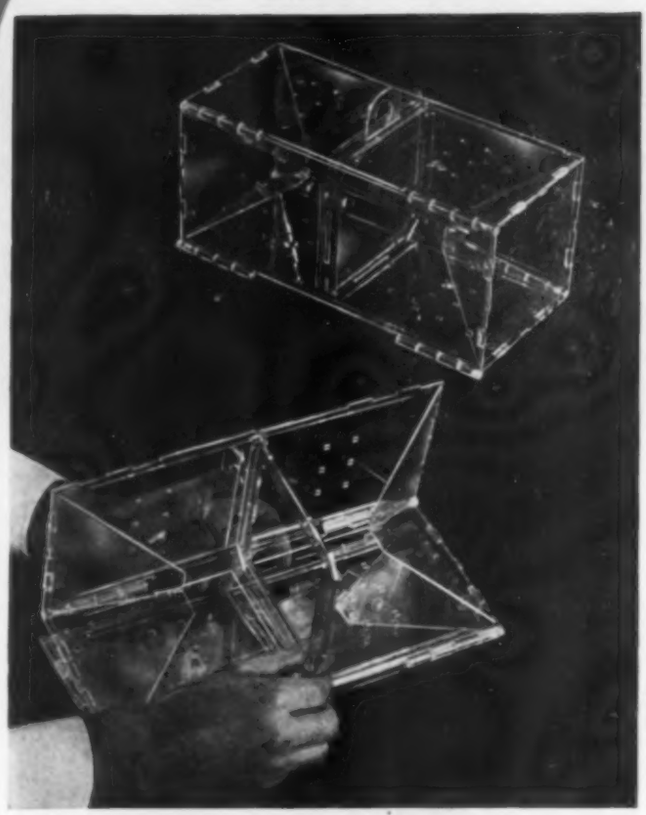
Even silicones are used

To round out the picture, mention must be made of the use of silicone resins for coating both flies and lines to make them float. In fact, the coating is almost indestructible in ordinary use.

Look over the fishing gear in any large tackle supply house. You'll find almost every thermoplastic there, plus phenolics, plus polyesters. In very few fields of manufacture has there been such opportunity for diversified uses of plastics and for ingenuity in achieving the desired end.

It takes a lot of ingenuity to catch a fish!

POLYSTYRENE



To assemble trap, center rib is inserted in two sides and remaining hinged sides are brought up from folded position

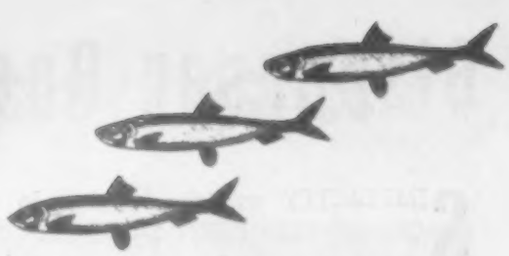
ANOTHER plastic fishing tackle item is a collapsible minnow trap which has 19 parts, all of them molded of transparent polystyrene. The unusually designed trap, known as the Minotrapper, is molded and assembled by Ontario Plastics, Inc., Rochester, N. Y., for Lewis E. Hamel Co., Inc., of the same city.

Koppers polystyrene is used to mold the parts of the trap because the manufacturer needed a material with good heat resistance and flexibility. The importance of heat resistance was proved when early models of the trap, made of other materials, warped when left out out in the sun in Texas and Florida. Flexibility is important because of design of the end-flap hinges, which must be bent during assembly.

Measures 6 by 6 by 13 in. open

The trap is 6 by 6 by 13 in. when it is open, but it folds to 1 by 6 by 13 inches. It weighs 1¼ pounds. Thus it is easy to store, and easy to carry. Setting up the trap is simple and takes only a few seconds

MINNOW TRAP



because all pieces are permanently joined together except the center rib section. The trap merely has to be unfolded and the rib inserted to be ready for use.

The 19 parts of the trap are: four main side pieces, eight end-flap pieces which form the entrance funnels, the center rib, and six hinge pins.

Warping part of production

The side pieces are produced in a two-cavity mold on a 1-min. cycle. One cavity produces a piece with hinges on two sides; the other molds a piece with hinges on one side and a lug catch on the other. Since only one lug catch is needed in each trap, the lug is trimmed off half of the pieces molded. Each trimmed piece later has the word "Top" hot stamped on it. The piece with the lug must be warped slightly so that it will put pressure on the catch. This is done by placing the piece across two blocks and weighting it in the center immediately after it is molded.

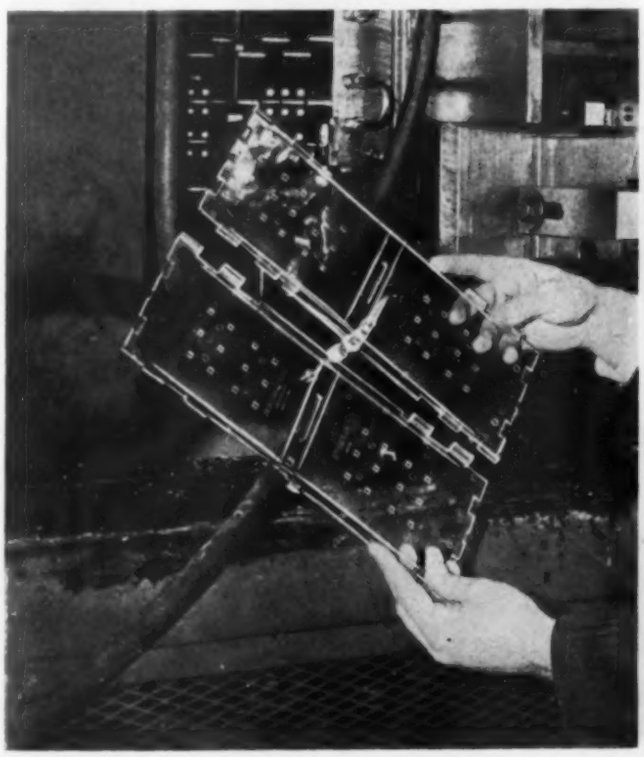
Each side piece has 12 square holes molded into it to allow the water to enter and leave the trap readily. Two of the sides have the trade name Minotrapper and the manufacturer's name and address molded in.

The end pieces are produced in a 4-cavity mold on a ½-min. cycle. The hinges by which the end pieces are attached to the sides, and to each other, are U-shaped hooks which engage slots molded into the side pieces. Lugs molded into the end pieces near these hinges prevent them from becoming unhooked unless the piece is purposely bent.

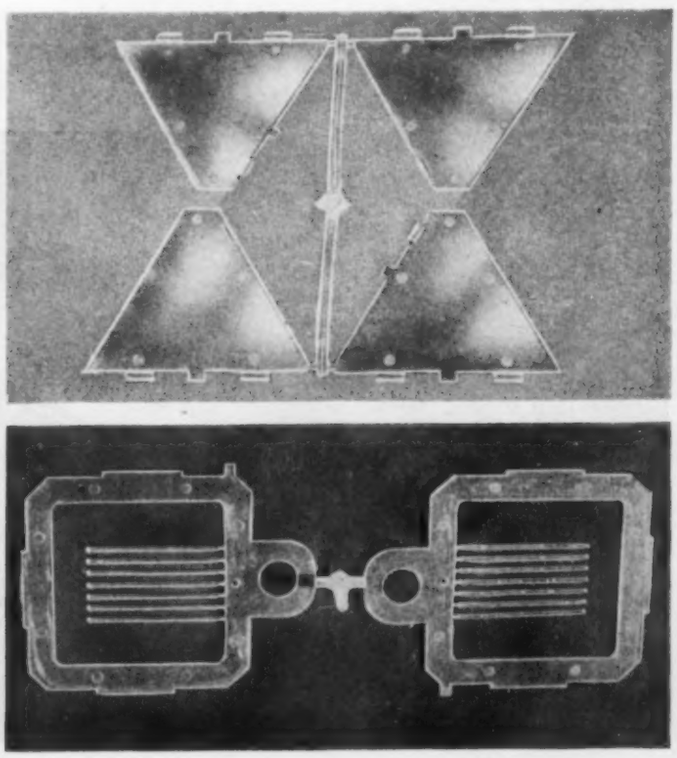
The center rib pieces are molded two at a time on a ½-min. cycle along with the hinge pins required to join the side pieces to each other. Only six pins are needed, but a seventh is molded as a spare. All three molds were designed by Modern Plastics Engineering Co., East Providence, R. I., and made by Marland Mold Co., Pittsfield, Mass.

The traps are assembled on a W-shaped jig which holds the side pieces near each other but holds the trap open so that the end pieces can be put in place. The complete assembly and packing job takes less than two minutes for each trap.

Two sides are molded in one shot. One section has hinges on both edges; the other has hinges on one edge and a lug catch on the other. The latter is warped slightly to make catch grip firmly



End pieces are produced in a four-cavity mold. Two center rib pieces and 14 hinge pins—sufficient for two traps—are molded simultaneously. Only six hinge pins are needed per trap; the other two are spares



Dispenser Redesign

reduced the number of parts from 29 to 9

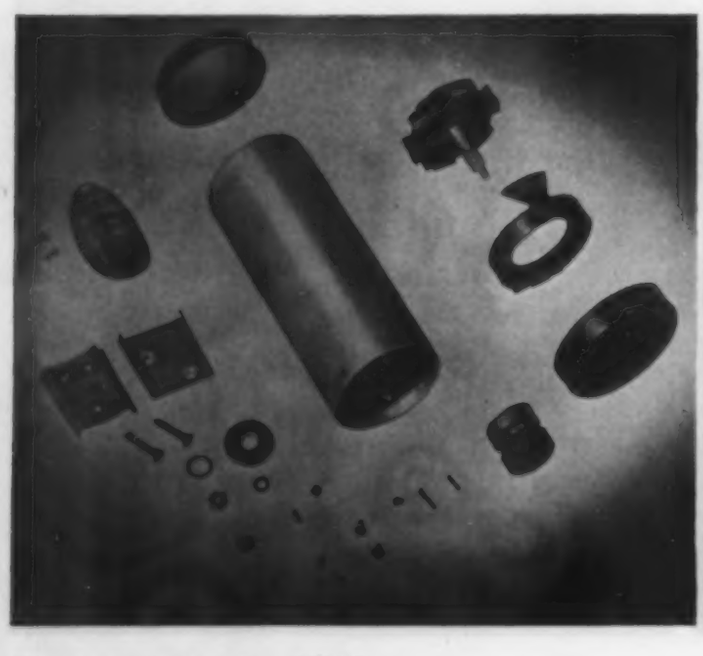
and eliminated many assembly operations

SIMPLICITY was the keynote in restyling the Morton Salt Tablet Dispenser. The result is positive proof of the axiom that the proper application of the right plastic material to new or existing products can usually produce highly desirable results — lower material costs, lower production costs, reduced shipping weight, less breakage or damage in handling, greater functional value, improved appearance, or greater sales appeal. There have been applications where only one of these advantages resulted. There have been many where all have accrued. Certainly, many of them were realized in the production of this redesigned salt tablet dispenser, parts for which are being molded by Molex Products Co., Chicago, Ill.

The original dispenser consisted of 29 parts — only four of molded phenolic and the rest metal. Smart redesign eliminated 20 parts and called for a total of four parts molded of Durez phenolic, one metal spring clip, one metal attachment bracket with two screws, and one labeling decalcomania.

The metal cylinder used in the original design required more than a dozen machining operations. The metal cover had to be stamped, punched, and painted, the final operation requiring the usual clean-up beforehand. The assembly of this basically metal unit called for handling each one of the 29 parts and the attendant operations. In the new design, only four assembly operations are needed — selector dispenser to body, spring clip to bottom of body, bottom cover or selector knob to insert stud in selector dispenser by means of one screw, cover to body. Bracket and screws are packed separately. The mounting bracket is actually an integral part of the molded housing.

The cover of the new tablet dispenser has an ingenious step arrangement corresponding to one on the housing by which the cover locks tight to the housing, is very easily released, yet no molded threads are required on either part.



Four phenolic parts, a metal clip, a metal bracket, two screws, and one labeling decalcomania make up new dispenser shown above assembled and unassembled. Only four operations are needed to assemble

Parts (far left) of original tablet dispenser (left) totaled 29 and necessarily required a great deal to time to put together. The metal cylinder alone underwent a dozen machining operations while cover had to be stamped, punched, then cleaned before painting

Packaging Machinery Uses Plastics

IN the packaging machinery field there has been an increasing use of plastics for both structural and functional purposes. In some cases the plastics do a mechanical job better than other materials; again, their chemical resistance may fit them to a specific purpose; their freedom from rust or corrosion is frequently the factor in their favor.

Bottle breakage cut

An example of plastics doing a better mechanical job than other materials is found in the phenolic laminated rotary star wheel made by the Formica Co., Cincinnati, Ohio, for the Glacier Springs Bottling Co., Cincinnati. This star wheel, which takes bottles from one conveyor and deposits them on another, was formerly made of cast iron. Contact between the glass bottles and the spokes of the metal wheel resulted in excessive bottle breakage, with a consequent loss of product and an adverse effect on production schedules.

The laminated star wheel, which has greater resiliency than the old cast iron type, has been in use at the Glacier Springs plant for more than 4 years. It is estimated that the use of the plastic wheel has reduced bottle breakage by as much as 40 percent.

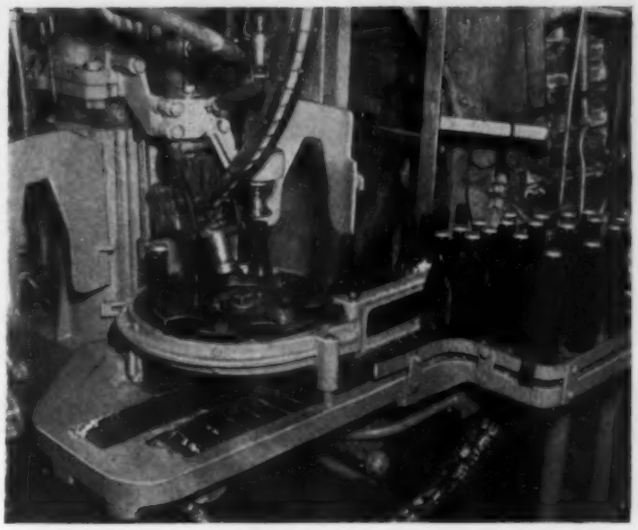
According to officials of the company, the laminated star wheel shows no signs of wear or deterioration, although the speed of the machine has been increased by 30% since the plastic unit was installed. Despite the fact that the wheel is drilled for five holding bolts, it shows no cracks or strains as a result of the repeated blows to which it is constantly subjected.

Because of the success of the star wheel, the same type of phenolic laminate has been adopted for similar parts in various machines at Glacier Springs. Formica is now promoting the plastic material for replacement parts, as well as recommending it for inclusion as original equipment in bottling machinery.

Plastics resist peroxide

The chemical resistance of acrylic and saran has led to their use in pipe lines and other parts in a 15-spout rotary filler for bottling hydrogen peroxide. All of the parts in the machine that contact the hydrogen peroxide are made either of acrylic or saran.

For years, Parke, Davis & Co., Detroit, Mich., had been using peroxide bottling equipment in which the contacting parts and the pipe lines were of such non-reacting materials as pottery, glass, or rubber. Two years ago the company changed over from its almost obsolete unit, which did not efficiently meet



Resiliency of phenolic reinforced plastic star wheel over metal cuts bottle breakage more than 40 percent

current production requirements, to a similar type of machine in which wide use was made of plastics.

Specification of acrylic and saran for the 15-spout filler was based on preliminary tests in which a number of plastic materials were tried. Hydrogen peroxide is highly reactive. Therefore it was necessary to find materials which would resist attack by the liquid and which, at the same time, could be fabricated into the necessary working parts.

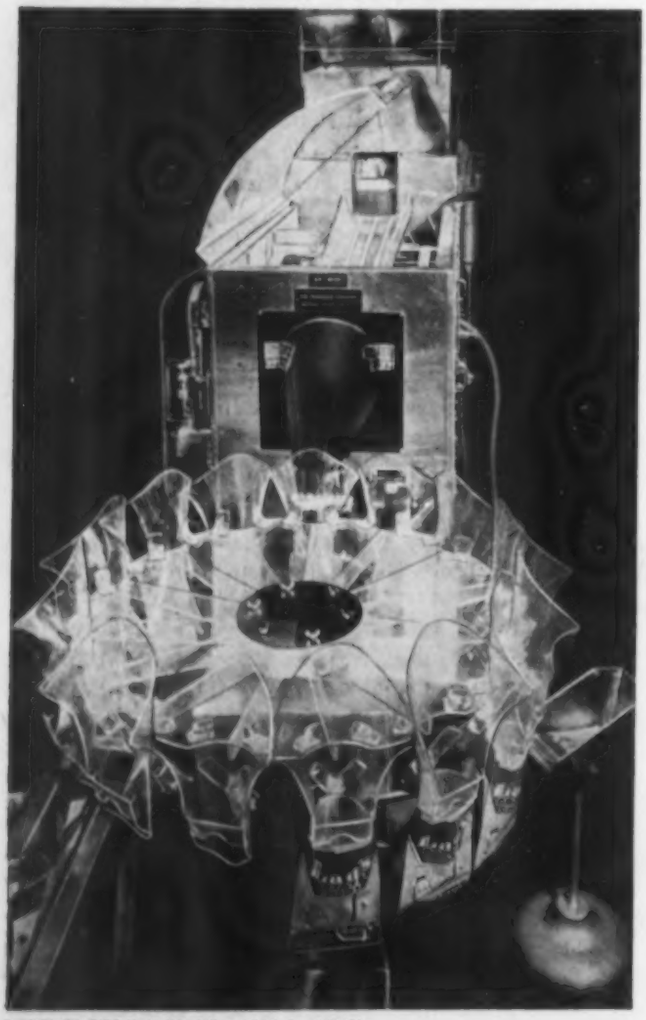
The company packages its hydrogen peroxide in three different size bottles. The new rotary filler accommodates all three sizes with only slight adjustments. No change-over of the plastic filling spouts is required.

The peroxide is piped directly to the filling machine through saran pipes and fittings from a supply tank on the floor above. Just before reaching the filling unit, the solution passes through a glass filter which is used as a final safeguard against impurities. The saran line conducts the peroxide directly into a 10 gal. acrylic tank. This tank, located on the filling unit, permits visual inspection of the amount of solution in the tank at all times. Individual filler spouts and a large circular turntable on which the bottles rest during the filling operation are also fabricated of acrylic. Other Plexiglas or Lucite parts include the interior working parts of the vacuum overflow chamber, which itself is formed by a large-diameter glass tube, and the tubing connecting the filler spouts with the supply tank. The tubes which conduct excess solution to the overflow chamber are saran.

Since its plastic working parts are not attacked

Potato chips leaving the supply hopper come in contact only with acrylic in their trip through feeder, weigher, and bag holding machines

Chips are blown into this bag holder, formed of sheet acrylic. Spring clip at bottom holds bag until filled and released



PHOTOS ON THIS PAGE COURTESY ROHM & HAAS CO.

Acrylic hood over weighing mechanism is raised in this head-on view of weigher and bag holder. Although in use over a year, plastic parts show no marked deterioration from salt and oil. They can be removed by hand for cleaning

by the hydrogen peroxide solution, it is believed that the new filling unit will require very little maintenance.

Acrylic potato chip machine

When packaging foods, the problem of rust or corrosion, set up by salt or fats, is always a serious one. Furthermore, in certain cases, as with potato chips, careful handling is necessary because of the light weight and fragility of the product.

When the Woodman Air-Weigh potato chip weighing and packaging machine, a product of Woodman Co., Avondale Estates, Ga., was first designed, there were difficulties encountered in studying the action of air blasts used in handling the chips. Accordingly, Gladwin Plastics, Atlanta, Ga., was called in to make exact duplicates, in Plexiglas and Lucite, of the stainless steel parts, with the thought that, after some of the problems had been solved, construction would revert to metal. However, after thorough testing of the acrylic unit, it was found that the plastic parts were entirely satisfactory for production use—so satisfactory, in fact, that acrylic parts installed on the first machine more than a year ago are still in use. The used parts show only a slight dullness of the surfaces. The corrosive action of salt has no effect on the acrylic; oil and foreign matter do not become embedded in the plastic.

In the development of the machine, one successful plastic part led to another until now the potato chips do not come in contact with any material other than acrylic from the time they leave the storage hopper until they reach the bag.

The machine consists of three units: The feeder, the weigher, and the rotary bag-holder conveyor. The part that plastics play in the machine can best

be understood by following the flow of the product from start to finish.

The potato chips are brought from the cooker into a stainless steel supply hopper. When a mass of chips is piled up in the hopper, the feeder comes into play. It separates the chips from the mass and carries them down an acrylic shaker chute to an acrylic scale hopper. The rate of feeding the chips can be adjusted to govern the number of bags per minute that will be filled and discharged from the other end of the machine.

The acrylic shaker chute has three longitudinal baffle strips formed in the bottom to help control the flow. The chute oscillates at a rate as high as 750 times per minute. From the chute the chips go through a swinging gate, also made of acrylic, into the scale hopper. When the required weight of chips has been delivered, the scale beam tips and automatically releases an air blast which momentarily closes the swinging gate. Another blast of air then blows the chips off the scale hopper and out through a snout into a bag held by a spring clip on the acrylic rotary bag holder. The scale beam instantly goes back to zero reading, aided by an air blast directed against an acrylic vane attached to the scale weight pan.

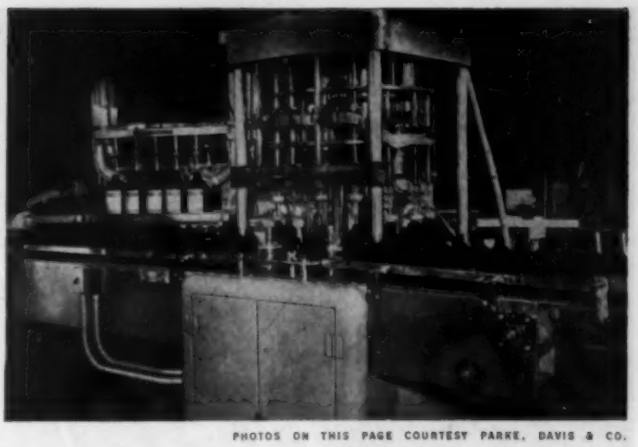
The blasts of air are so controlled and synchronized that the chips are first suspended in air and then, gently and easily, are blown into the bag. The substantial ribbed wheel of the bag holder is synchronized with the operation of the feeder and weigher so that each bag passes under the filling snout at the right moment to receive its charge of chips. The plastic bag holders are made in eight different sizes, and are interchangeable.

Other acrylic parts include the cover over the weighing machine; the scale housing which protects the base of the scale beneath the hopper; and the spill chute inside the feeder which catches the crumbs and siftings. The spill chute drops these small particles down into a service drawer from which they are periodically removed.

Early customers, seeing the chips blown from the clear snout of the first model machine into the bags, were appalled by the speed and feared breakage despite contrary evidence. So for psychological reasons, the snout is now made of black acrylic.

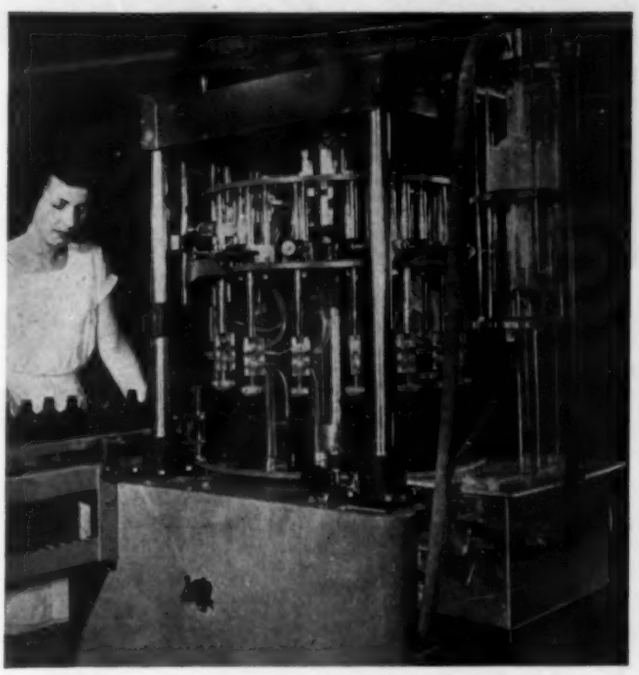
In addition to the non-corrosive advantages of using acrylic in these machine parts, the plastic is less costly than metal due to its ease of forming in complex curved shapes. Too, the clean shining appearance of the machines themselves and the visibility of the product in process make the units a "show" spot in any plant.

The plastic parts through which the chips pass are cleaned daily by wiping them with a solution of a wetting agent in water, then rubbing them with a dry cloth. To expedite cleaning, the parts were so designed as to be removable by hand.



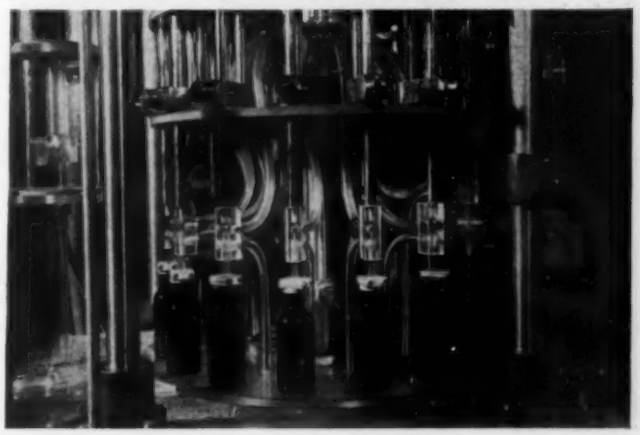
PHOTOS ON THIS PAGE COURTESY PARKE, DAVIS & CO.

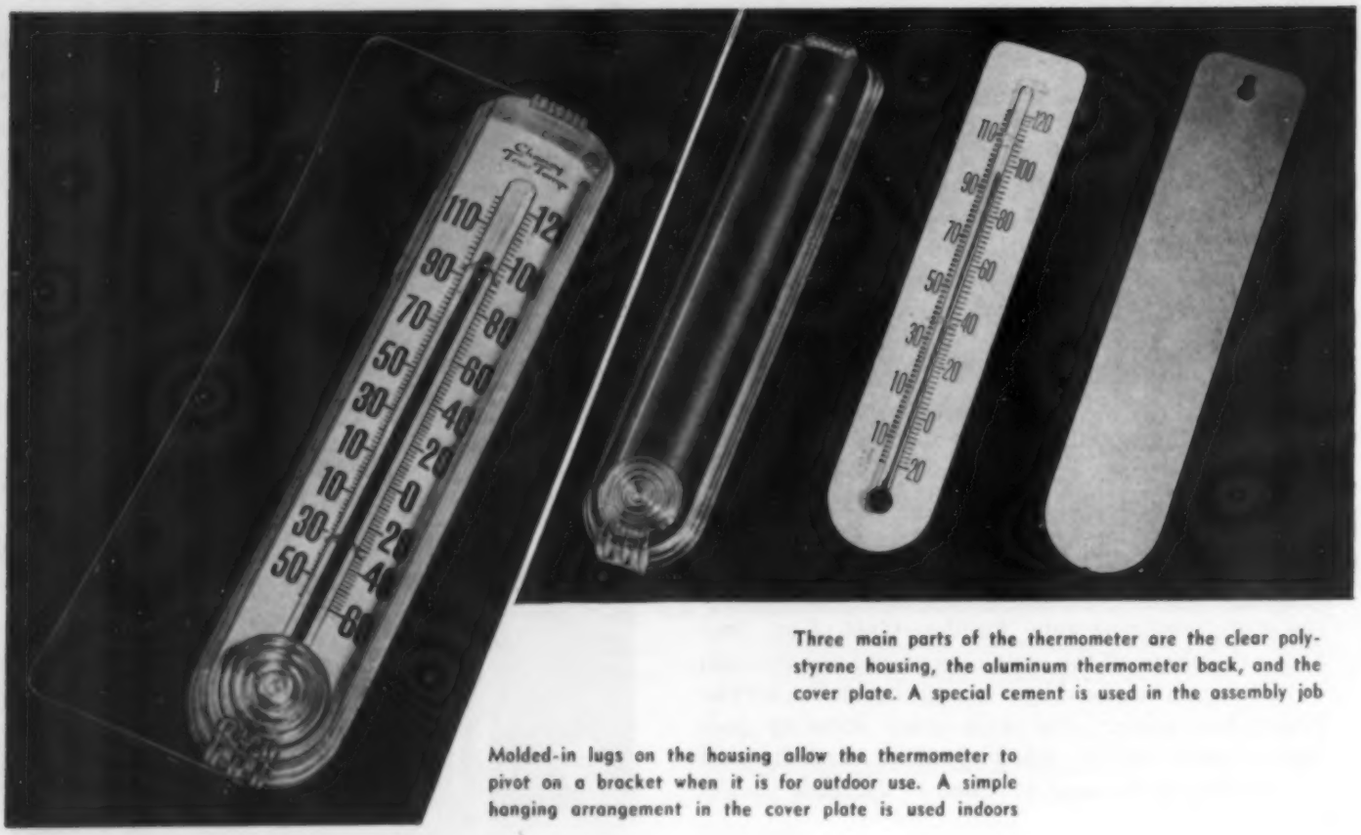
All parts of rotary bottle filling machine contacting hydrogen peroxide solution are made of acrylic or of saran



Supply tank and vacuum chamber for peroxide overflow are acrylic. Saran pipes solution from upper floor to filler

Filling nozzles are machined from solid acrylic. Lower set of tubes are of flexible acrylic; upper set of saran





Three main parts of the thermometer are the clear polystyrene housing, the aluminum thermometer back, and the cover plate. A special cement is used in the assembly job

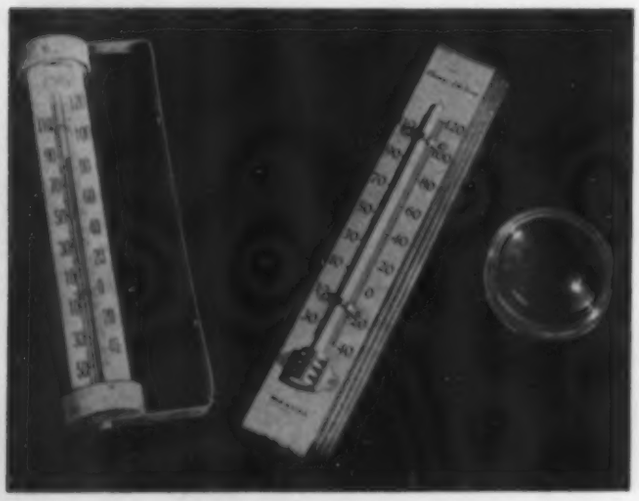
Molded-in lugs on the housing allow the thermometer to pivot on a bracket when it is for outdoor use. A simple hanging arrangement in the cover plate is used indoors

Thermometers Housed in Plastic

by ALFRED F. FUKAL*

WITH a plastic flashlight lens supplying one of the starting ideas, a new low cost thermometer with a transparent polystyrene housing which magnifies the readings and also protects the fragile glass tube and bulb in shipment has been marketed by the Chaney Mfg. Co., Springfield, Ohio.

Two old style thermometers point up design changes which were inspired by reading glass effect of a flashlight lens



Some months ago, this manufacturer of inexpensive thermometers decided that a switch to plastics might prove sales wise. The quick and easy approach to this problem would have been to design some new thermometer backs. These would have looked a little different, would probably have cost more than the wooden ones then in use, and the result in increased sales would have been negligible. Such a procedure would, in fact, have been a substitute approach of the sort which is all too often practiced.

What was actually needed was a basically new concept, where plastics were out in front, not in back, where plastics would provide new merchandising and use advantages.

During early design conferences the customer was impressed with some flashlight lenses he had seen, and these gave the starting idea. Why not put the thermometer into a transparent housing, making a completely sealed unit? Such a unit would solve the otherwise onerous problems of keeping the merchandise clean on the counter and of protecting the fragile glass tube and bulb in shipment. Also, a "reading glass" effect could be produced as

*F. & L. Fukal, Cambridge, Ohio. Industrial designers and merchandise developers.

in the flashlight lens, strengthening the housing considerably.

Since a shield was necessary to protect the bulb from direct sunlight, and slots were needed to let air in, a debossed "bull's-eye" of V-shaped concentric rings was devised to serve as the shield. This also hid the bulb and provided a dramatic focus of attention for the merchandise. Short ribbed pads were added to the top and bottom of the case to further strengthen it and to disguise the air inlet slots located near the bulb. Thus, the entire shape of the unit and even the parts, which appear to be pure decoration, grew out of necessity and have a functional purpose.

The molding of the housing presented some difficulties. The cross-section of the piece varies from approximately 0.062 to almost 0.266 in. and such a design is obviously no copy-book example of the best thing to do. Yet to compromise would have diminished the results sought. The Plastics Div., Continental Can Co., Cambridge, Ohio, solved the problem after a few experimental molding shots and changing of runners. The perseverance of the engineering department was rewarded with crystal clear pieces — molded of Lustrex or Styron — now rolling out of the six-cavity mold at 70 shots per hour. Continental also developed a special cement which holds the aluminum thermometer back securely in place.

The unit now comprises a simple assembly job in which the tube is fastened onto the graduated back and sealed into the housing. A cover plate is next sealed in, and the job is finished. The "reading glass" effect produces a thermometer more easily read than any other of its size on the market.

Small lugs molded onto the top and bottom of the housing act as bracket pivots for the outside type thermometer. With the lugs removed, a simple hanging arrangement in the back transforms the same basic unit into an inside wall thermometer.

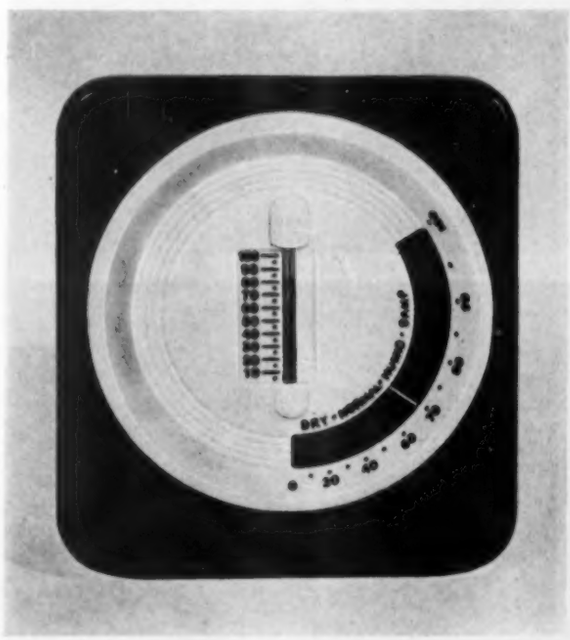
Through the reflections picked up by its curved surfaces, this item completely adjusts itself to any color scheme in the room, an extra benefit not found in other wall thermometers.

Proof of the soundness of the design and of this plastic application is found in the results. Without special advertising and by simply placing the item in the hands of competent jobbers, the manufacturer has sold to date over a half million of these thermometers in a highly competitive market.

Biplastics Strip in Hygrometer

RELATIVE humidity, recognized to have great importance in air conditioning homes and offices, in maintaining health and comfort, and in preventing rust and mildew, can be accurately measured with a new hygrometer, a product of the Humidial Co., Washington 25, D. C., which makes use of a biplastics strip that curves with changes in relative humidity. Both of the plastic materials in the humidity sensitive element expand uniformly with temperature and thus, it is reported, minimize errors in humidity reading due to temperature changes.

Formerly, accurate hygrometers were seldom seen in homes because of their high price. The Humidial, which comes in a choice of two color combinations, is priced relatively low. The new instrument is claimed to be three times as sensitive as former hygrometers in the popular price class. It is also claimed to be superior to similar instruments in correction for temperature, freedom of parts from rust, lightness, simplicity, and the fact that it will stand a wide range of temperatures without affecting the biplastics strip.



End of two-plastic strip projects through window of hygrometer and, as strip bends under changing conditions of relative humidity, moves on numbered scale. A small thermometer is mounted in the center of the two-color polystyrene housing

Sound and Action in Pull Toy

A TOTAL of 10 parts, nine of them plastic, are used to make Monko, a pull toy which rolls its eyes, opens and closes its mouth, and "chatters" as it is pulled. The two-part head is molded of ethyl cellulose, because of the high impact strength of the material. The eyes, lips, gears, and wheels are polystyrene.

The wheels, which are hidden from view, extend just far enough below the bottom of the head so that the toy rests on them. A gear between the two wheels meshes with a gear between the two eyes so that the eyes turn with the wheels. One of the wheels has an off-center axle which serves as an eccentric gear to move the lips up and down as the wheels rotate.

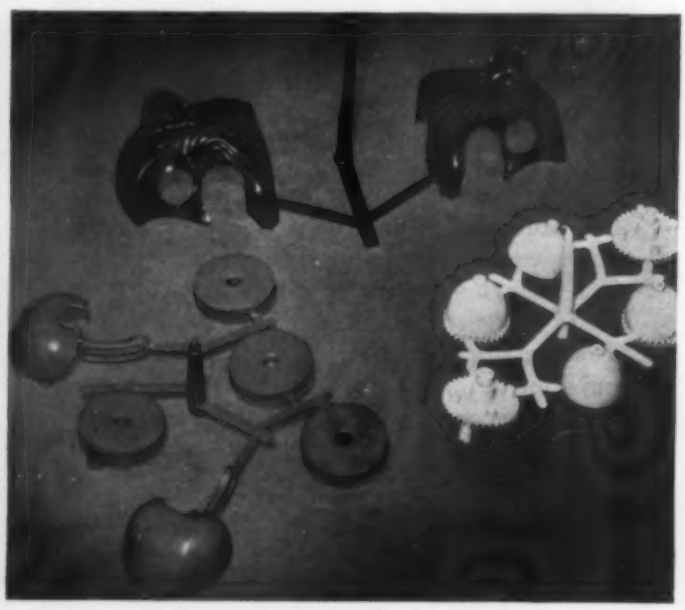
MacDonald Mfg. Co., New Baltimore, Mich., molds and assembles the toy for Model Craft, Inc., Detroit. The materials used are Ethocel and Styron.

Three molds used

Three molds are used: a two-cavity head mold, a combination mold to produce two lips and two sets of wheels, and a combination mold which turns out two sets of eyes and gears. Each mold is run on an 8-ounce machine. The head mold has tool steel cores and beryllium copper cavities, and is run on a 40-sec. cycle. The other two molds have both cores and cavities of tool steel. The mold for the lips and wheels is run on a 35-sec. cycle; the eye and gear mold has a 30-sec. cycle.

After the parts are molded, the metal spring which makes the chattering noise (the only non-plastic part) is welded to a lug on the inside of the head. The two eye halves are cemented together with benzine used as a solvent, and the eyes are spray-painted. The ears are dipped in lacquer to obtain the desired color.

The wheels and lip are assembled to the eccentric gear, and all parts are then mounted in their proper positions in the left side of the head. The assembler then puts solvent into holes in the ends of the gears, and puts the right side of the head in place with molded-in lugs in the solvent-filled holes. The assembled toy is then placed in a clamping fixture for an hour.



Left — Eyes and lips of monkey are moved by gears as the toy is pulled. Below — Only one head is molded at a time, but lips, wheels, eyes, and gears for two toys are produced in each molding cycle. Below, left — Parts required for one toy consist of two head halves of ethyl cellulose, and two eyes, a lip, two wheels, and one separate gear, all polystyrene

Technical Session on Reinforced Plastics

REINFORCED PLASTICS fabricators have outgrown the "knee-pants" stage and are beginning to take on some man-sized commercial assignments. But their enthusiasm has been tempered with sober caution. Most of them are screening new applications carefully to make certain of their economic soundness in competition with other materials and techniques.

This emphasis on proper applications keynoted the fourth annual technical session and exhibit of the S.P.I. Reinforced Plastics Div., held January 12 to 14 at the Edgewater Beach Hotel, Chicago. Registration of approximately 200 marked an increase over last year's session and saw a greater number of firms represented. In addition to resin and filler manufacturers, mold and machinery makers, designers and consultants, many present were from firms now using or studying the use of reinforced plastics in their own products.

The finished appearance of reinforced plastic parts received notable attention at this year's conclave. With Uncle Sam no longer the only major customer for reinforced plastic parts, manufacturers are working hard on improved product appearance and merchandising appeal. Among the trends observed in the many products exhibited was the increased use of specially patterned surfaces which produce pleasing decorative effects in such items as radio cabinets.

A special exhibit by the U. S. Naval Air Development Station, Johnsville, Pa., featured drop tests in which a 1¼-lb. steel ball was dropped 25 ft. on sample sections of aluminum sheeting and glass fiber honeycomb, representing the nose radome of military aircraft. Conditions simulated the impact of a hailstone striking a plane at 300 mph. In this test, the aluminum was badly smashed in, while the ball bounced off the plastic panel without harm. As a result of this naval development program, 210 nose radomes of the glass fiber honeycomb construction have been ordered. Lunn Laminates, Inc., Glen Cove, N. Y., and Lincoln Industries, Damascus, Va., have cooperated in this program.

At the conference luncheon on January 12, George H. Clark, president of S.P.I., spoke on the points to be considered in setting up standards for the reinforced plastics industry. His brief address preceded the showing of the new S.P.I. film on "The Scientific Approach to Better Plastics."

Papers presented at Fourth Annual S.P.I. Reinforced Plastics Div. meeting

DECORATIVE SURFACING OF REINFORCED LAMINATES

by T. Walter Noble, Morart Gravure Corp.

THE subject of decorative surfaces for laminates is extremely complex because it combines the utilization of color, texture, materials, and techniques. The most important quality is that of color, which can be incorporated in a variety of ways, each of which has its own inherent advantages and disadvantages.

The technique of incorporating color in the resin formulation for decorative laminates was tried first and is still used to date. The disadvantage of resin-pigment surface coating is the fact that it is difficult to achieve color control. Another method of producing solid color effects is the use of pigmented paper with which any crazing tendency is completely eliminated and constant control of color is possible.

Dyes can be used throughout the laminate assembly by adding to the resin mix, and this method results in excellent depth of color. Colored fibers have also been employed to produce decorative surfaces.

One of the first design methods employed for decorative purposes and still used to some extent is that of inlaid color. The use of printing methods is probably the most universal and versatile method of producing designs in reinforced laminates. The simplest method is that of sheet printing which is particularly suitable for printing small runs such as graphic laminates. The rotogravure method of printing on a continuous web of paper is probably the lowest cost method of reproducing designs.

In addition to color and design as a means of producing decorative surfaces, "texture" is also employed. The term "texture" implies not only a three dimensional effect and particle or fiber orientation and association, but an idea association as well. For instance, the use of actual woven fabric or special long fibered papers produces a laminate which is not only attractive in itself, but at the same time conveys an association with known materials.

A considerable quantity of phenolic surfaced plywood has been produced by the use of galvanized sheet metal cauls or press plates. These produced a rather attractive surface even though the resulting appearance was not the primary reason for the use of this type of caul.

THE MANUFACTURE AND PROPERTIES OF PLASTIC SURFACED PLYWOODS

by Norman G. Bull, Kimberly-Clark Corp.

PLASTIC surfaced plywoods as manufactured commercially for the last five or six years consist essentially of plywood surfaced with paper impregnated with thermosetting resins. A high resin content plastic

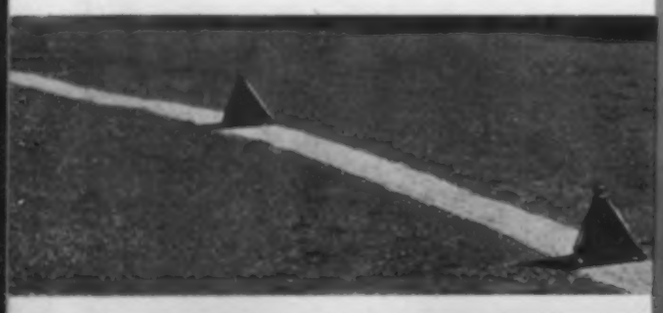
(*Please turn to page* 150)

PLASTICS PRODUCTS

No bigger than a dime, this precision Q-Switch for electrical applications is said to have a minimum life of 100,000 operations at 5 amp., 125 v., A.C., and 50,000 operations at 10 amp. R.E.C. Mfg. Corp., Holliston, Mass., molds two-part Bakelite phenolic housing for Mu-Switch Div., Chase-Shawmut Co., 38 Pequit St., Canton, Mass.

Flocks of inflatable blue, red, and white Shmoos are finding their way into bathtubs, play pens, nurseries, and schools to delight youngsters everywhere. These Dogpatch residents are manufactured from Vinylite plastic material by Vanguard Corp., Springfield, Mass., in four sizes — ranging from 5 to 17 inches. They are inflated by means of non-mechanical valves and have jingle bells sealed inside

Flexibility, ability to take excessive abuse and rough handling, resistance to grease, chemicals, and abrasives, and imperviousness to temperature changes are qualities of these Bakelite polyethylene markers for freshly painted highway strips. Manufactured in a variety of colors by Plastic Engineering, Inc., 8506 Lake Ave., Cleveland 2, Ohio



A miniature merry-go-round which actually moves when the lamp is lit features the Slumber-Lamp manufactured by Econolite Corp., 3517 W. Washington Blvd., Los Angeles, Calif. Youngsters and their unusual steeds are painted on a clear Kodapak cylinder which revolves around a circus-decorated center Kodapak cylinder. R B Plastic Co., 5112 W. Jefferson, Los Angeles, molds base of red Lustron polystyrene.

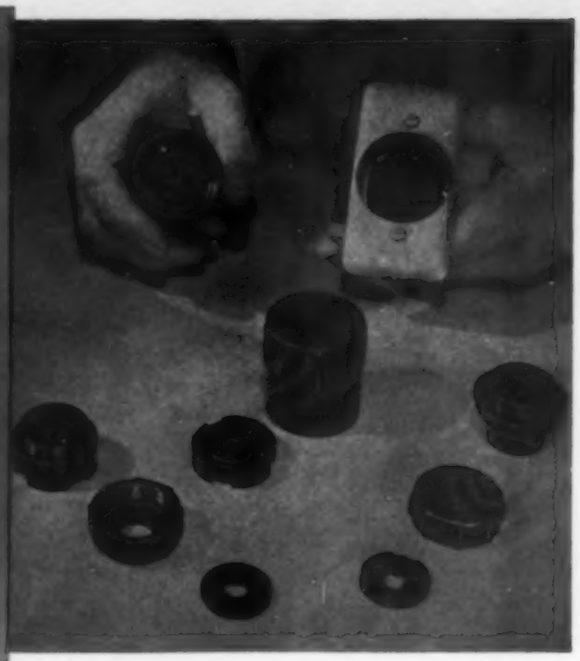
Plastic hand dispensers for Scotch brand cellulose tape are now available for home use. The dispensers come in four bright colors and are molded of polystyrene in two parts by Minnesota Plastics Corp., 366 Wacouta St., St. Paul, Minn., for Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul. The two parts snap together to hold the roll of tape. Brown dispensers for office use are also being made

All types of auto bulbs in the 6 to 12-volt range can be checked on this tester molded of Lustrex L polystyrene. The pillars support 7-in. sealed beam headlamps. Made by Conlin Eng. Co., 21 Lawson Lane, Burlington, Vt., for Lamp Div., Westinghouse Electric Corp., Bloomfield, N. J.

White, ivory, red, yellow, blue, or green telephones to harmonize with any color room are possible with the Colorphone, a Tenite II cellulose acetate butyrate telephone cover. This consists of five pieces which enclose the base, the complete handset, and also cover the dial. The resilient butyrate parts easily snap into place for a snug fit. They are molded by Automatic Plastic Molding Co., Emeryville, Calif., for Colorphone, Inc., 5865 Picardy Dr., Oakland

The slender green and gray marbleized cellulose acetate container for Chypre Talc is shaped for ease of handling as well as for beauty. Detroit Macoid Corp., 12340 Cloverdale Ave., Detroit 4, Mich., molds the containers of Tenite for Coty, Inc., 730 Fifth Ave., New York, N. Y.

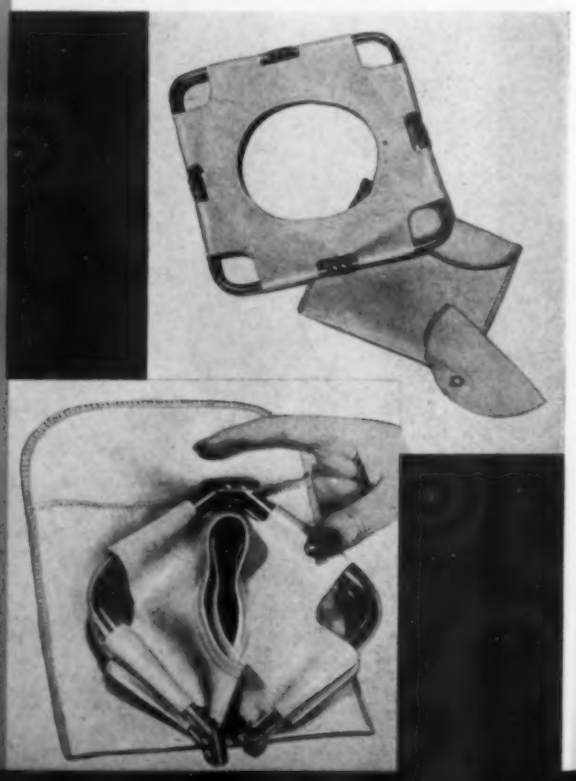
Correct balance of Ken's Flying Helicopter enables it to glide gently to the ground and land in an upright position every time. This, coupled with light weight, makes the toy long wearing. A string wound around the motor shaft is pulled to provide take-off power. Trimold, Inc., Kenmore, N. Y., molds the toy of Tenite cellulose acetate in a variety of bright, attractive colors. Manufactured by Flying Toys, Inc., Niagara Falls, N. Y.



Accidental jerks or pulls have no effect on this Durez phenolic electrical coupling. It is automatic-locking and unlocking, and is made with two- or three-prong plugs. Automatic Plastic Molding Co., Emeryville, Calif., molds the plastic parts for P. & V. Quick-locking Co., Inc., 927 N. Lincoln St., Stockton, Calif.

A 500-ft. visibility day or night in normal weather is provided by this vacuum-operated, automatically illuminated signal arm for trucks. The Tenite II cellulose acetate butyrate arm consists of two amber panels set into an opaque white section. Signal positions are controlled from the steering column. Molded by Mutual Plastic Mold Co., South Gate, Calif., for Vac-O-Lite Signal Co., Inc., 3153 E. 82nd St., Seattle

For use away from home, the Baby Sitter toilet seat folds into a 4½-in. square to fit into handbag or pocket. Made by Dorsey Co., 3861 Cardiff Ave., Culver City, Calif., it consists of a vinyl chloride seat fitted on a hinged metal rod with vinyl tubing corners. Case and deflector are also vinyl chloride

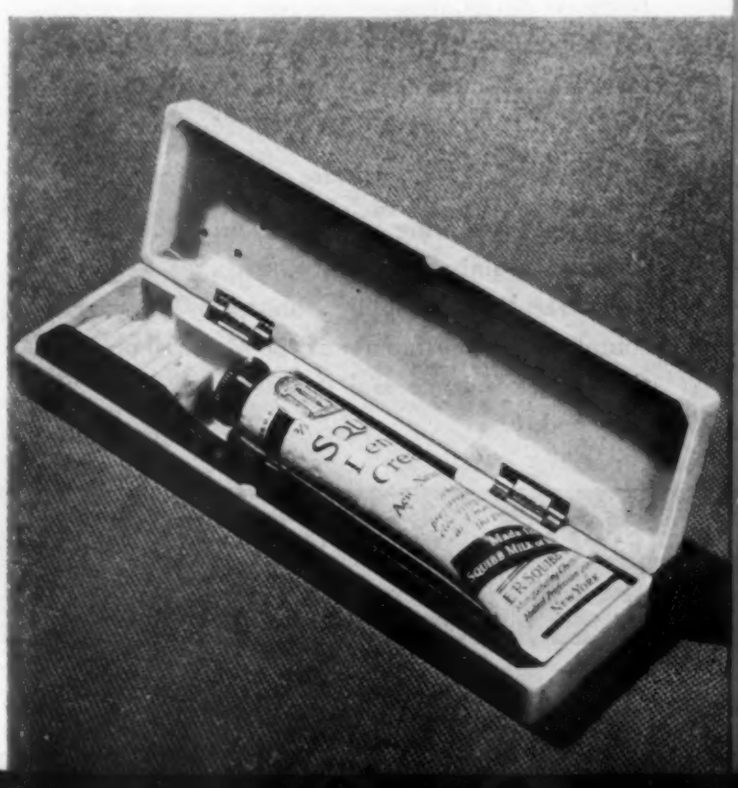


PLASTICS PRODUCTS

A variety of uses may be found for the Baby Stoway container molded of transparent colored Styron polystyrene. It can be used in lunch boxes, to store leftovers or baby food in the refrigerator, or as a dessert cup and mold. The twist seal lid has a raised groove which permits easy stacking and holds cup in place when the lid doubles as a coaster. Made by Southern California Plastic Co., 1805 Flower St., Glendale, Calif.

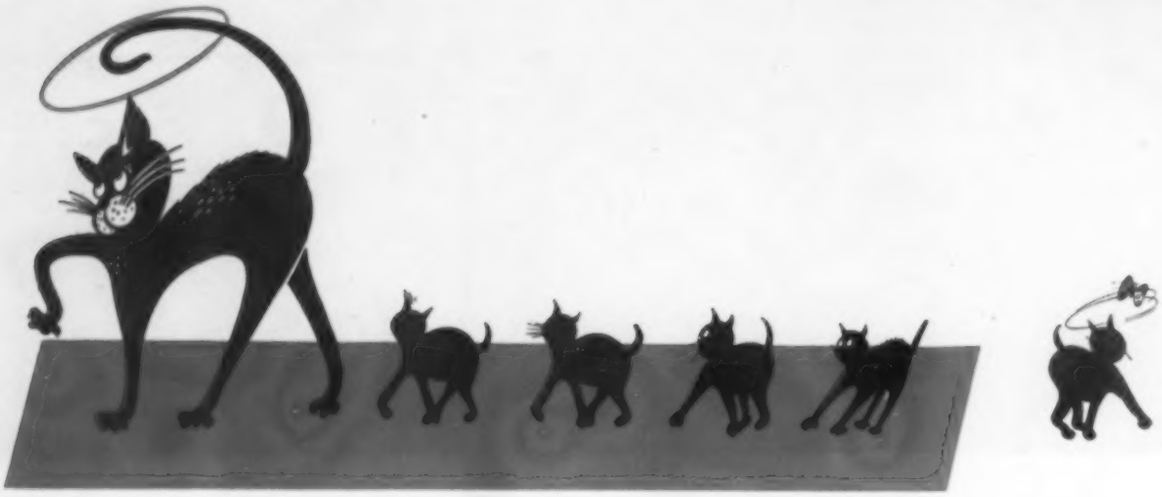
Weighing 1½ oz., and about the size of a silver dollar, the 6-ft. Princess tape rule is designed especially for women who sew or knit. Modern Plastics Co., Inc., 4641 Pacific Blvd., Los Angeles 11, Calif., molds the colorful ethyl cellulose case in two parts for Carlson & Sullivan, Inc., Monrovia, Calif.

Compactness and ease of cleaning keynote this toothbrush kit for use in the home, office, or while travelling. Plastic Products,. Inc., South Norwalk, Conn., molds the two parts of Beetle urea formaldehyde in a 20-cavity combination mold. Use of a spring hinge made by Cavu, Inc., Box 392, Downey, Calif., permits installation of lids without gaps between lid and box. Marketed by Morskil Co., 415 Lexington Ave., New York, N. Y.



Beau-regard, his face freshly washed, is ready for slumberland too. The cuddly calf child of Elsie and Elmer is made of pink, blue, or gold plush with a Vinylite plastic face. He has soft wooly curls and a zippered pocket in his back. Produced by Knickerbocker Toy Co., Inc., 650 Sixth Ave., New York, N. Y.

LIKE TO DUPLICATE A GOOD THING?



DO IT WITH HOBBED CAVATIES BY MIDLAND

Illustrated above is a Midland Hob that is only 15/16" in diameter—yet it is pushed 5-1/2" into a steel die block to form a perfect hobbed cavity. It can be used again and again to duplicate the original cavity at a tremendous saving to the user.

You can greatly reduce the cost of making multiple cavity molds by bringing your problems to Midland. At Midland you'll find all the technical skills, the equipment, the craftsman and the know-how it takes to produce Hobbed Cavities that guarantee uniformity, superfine finish and serviceability.

Intricate detail, unusual contour, extreme depth—characteristics that once required costly duplication by machining are handled perfectly by Midland at a fraction of the time and cost of machining methods.

If you are planning molds for injection or compression molding take advantage of Midland's skills. The book "Shaping Tomorrow Today" gives complete information about the Midland organization, its experience and facilities. Write for your copy today.

MIDLAND DIE AND ENGRAVING COMPANY
1800 W. BERENICE AVENUE • • • CHICAGO 13, ILLINOIS
Makers of Plastic Molds • Die Cast Molds • Engraved Dies • Steel Stamps • Hobbings • Pantagraph Engraving

D&E

Trouble-Shooting Molding Problems†

by FRANK J. DONOHUE‡

MOLDING problems are always interesting, sometimes baffling, frequently irritating, and more rarely amusing. They can cause a number of well defined ailments among molders — acute melancholia, headaches, severe degeneration of the bankroll, and molders' ulcers, the latter a pernicious and more or less chronic occupational malady.

They arise — both the problems and the ulcers — when and for any reason, and sometimes apparently for no reason, a plastic mold does not perform as expected. It may be a new mold, its original cost increased 50% by a lot of overtime toolroom work and delivered three to six weeks late. If the molder then finds that it will not perform satisfactorily with any of the available commercial molding compounds, and he faces an immediate delivery date on finished parts, his only immediate recourse is to reach for the aspirin and the stomach remedy.

Or, it may be a mold which, after the usual initial break-in period, has operated satisfactorily for days, weeks, or months. Suddenly and inexplicably, trouble develops and rejects pile up. Yet, the molder would be willing to testify under oath and quite sincerely that he had changed no single factor among the operating conditions, not even the part in his hair. It is then that he begins to entertain some dark suspicions, spoken or unspoken, about the molding material. And it is then that the material supplier's technical service man is called in to help in tracking down and liquidating the villain.

However unusual and even unique these problems appear, they stem from one or more of the following factors: part design, mold design; variation in molding conditions; or material variation.

Even though contrary to fact, let us assume that the millennium has arrived; that the part design is eminently correct, clean, and functional; further, that the mold is a pure gem of tool design. None of those insidious pitfalls that so often beset the molders' path are present — the lurking undercut, the long straight hole without any taper, the thick and thin sections nestling snugly side by side in the piece, with their inevitable tendency toward warpage; the thin unsupported sidewalls with transverse dimensions that, the designer insists, must be held to a tolerance of minus zero, plus two thousandths, even while he cheerfully admits that the metal stampings to be assembled within the part can't be held to a tolerance closer than plus or minus five thousandths. If we can safely make these broad assumptions, and if trouble is nonetheless encountered, the cause must lie with the molding conditions or in the material.

What has been said up to now applies with equal force to both thermoplastic and thermosetting materials. However, the discussion from this point on will be confined to the field of thermosetting phenolics where, in the writer's opinion, the problems encountered are more complicated and just as numerous as those occurring in the thermoplastic field.

Variations in molding conditions

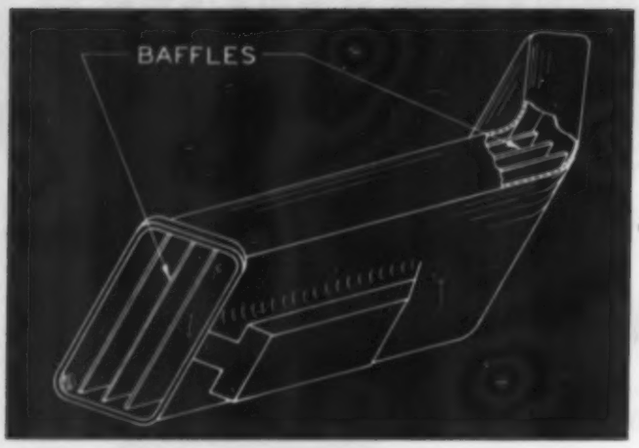
Anyone who is disposed to look at plastic molding realistically will certainly admit the ever-present possibility of variation in molding conditions. This possibility is, in fact, so well recognized that when trouble arises, the service man is not only permitted but usually invited by the molder to inspect the job and investigate the problem.

Variation in molding conditions is taken here to mean any change, whether voluntary or not, in tools or operating methods in the molding plant which adversely affects performance of the molding compound. For example:

1) A given lot of phenolic material, previously found satisfactory on other jobs, is used on a new mold having deep, intricate sections and insufficient taper. The molded parts blister badly and stick.

2) A faulty surface pyrometer, reading 30° low or high, is used to measure and control mold temperatures. The molded parts are either undercured and blistered, or are incompletely filled out and show heavy flash. (*Please turn to page* 82)

*Reg. U. S. Patent Office.
†Paper presented before the Fifth Technical Conference, S.P.E., Philadelphia, Pa., January 19-21, 1949.
‡Manager, Technical Service Thermosetting Molding Materials, Plastics Div., Monsanto Chemical Co.



SKETCHES COURTESY NOMA ELECTRIC CORP.

Sketch 1 — Defiance preform boot with baffles

Sketch 2—Stokes preform boot with baffles

3) A water-logged steam trap, steam channels in a mold partially blocked with scale, or channels in the heating platens in which diversion plugs have shifted, cause poor heat transfer and low, non-uniform mold temperatures. As a result, cure time is excessively long, the molded pieces have a dull surface and lack proper strength, or localized blistering occurs.

4) Molding pressure is insufficient, or is dissipated on lands in the molds. Flow of the material, as a consequence, is insufficient. Molded parts do not fill out or flash is heavy; again, mechanical strength of the part is poor.

Variations in material

It must be recognized that phenolic molding materials, however commonplace and prosaic in appearance, are actually very complex, heterogeneous, collodial mixtures. It is generally accepted by authorities on high polymers that phenolic resins are cross-linked condensation polymers of high molecular weight, but no one has yet established with any degree of certainty the actual chemical structure of these resins.

Since these substances are not true chemical compounds, there are no chemical constants — boiling points, freezing points, vapor pressure values, or quantitative solubility values — that can be used for analysis and control. In fact, at the stage of polymerization which occurs during molding, when it would be most desirable to know what is occurring within and around the complex resin molecules, the resin is so insoluble and chemically inert that it defies all of the older, traditional methods of chemical analysis.

Under such circumstances, in order to control quality, physical properties of the resins and molding materials must be measured by empirical methods, using tests that are as simple and foolproof as possible and which duplicate or simulate conditions of actual use.

In addition to this, the materials are carefully blended during and after production to minimize and average out variations in individual production batches. In these final blends, usually identified by serial numbers, there are, when all goes well, only minor variances in granulation, moisture content, and plasticity as prescribed by manufacturing specifications. These variances are well within the limits of precision of the usual commercial molding operation.

Aside from variations that may occur during manufacture, there are other things that can happen to the molding compound and impair its performance in the molding plant, as for example:

1) The material absorbs moisture in transit or during storage at the customer's plant. Symptoms of this condition will be slow cure and blistering. and, in the case of an electrical grade material, higher than normal power factor and low insulation resistance and dielectric strength.

2) The material has been accidentally or carelessly exposed to heat during the shipment or in storage. It has lost some of its normal moisture content and has also been "advanced." It may be found too stiff in plasticity when molded.

3) The material becomes stratified in the container due to vibration and jolting during shipment. This is more noticeable in drum shipments. The finer particles settle toward the middle and bottom of the drum, leaving the coarser fractions at the top. If the material is preformed without agitating or rolling the drum, pill weight may vary excessively.

Preforming problems

In modern molding practice, using large multiple cavity flash type compression molds, or transfer molds and electronic preheating, the molding compound is practically useless if it can't be preformed

Table I.—Preforming Problems

SYMPTOM

Poor ejection—The pills show vertical score marks and horizontal cracks on sidewalls. In severe cases, the top of the pill flakes off during ejection, and the preformer labors and pounds excessively.

POSSIBLE CAUSES	REMEDIES
1. *Worn preform dies*—From long use at a given depth setting, the cavity has developed a larger inside diameter at the bottom than at the top. The pill is forced during ejection through the smaller area at the top of the die, causing it to bind or break up.	1. This condition cannot be satisfactorily overcome by any change in material. Die must be ground to uniform inside diameter, polished, and plated back to size; or new die must be built. It is good practice to chrome plate preform dies in any case, to cut wear and aid ejection. A slight taper helps.
2. *Insufficient lubricant in the molding material*—A small amount of lubricant is added to final blends of standard material to aid preforming. In certain cases involving large preforms, because of greater ratio of area to volume, this standard amount may not be sufficient. This cannot be determined readily in advance.	2. Increase the amount of lubricant in small increments until the optimum amount is found. Avoid an excess since this will spoil cohesion and tend to produce soft pills. A marked excess will also impair molded appearance and produce lubricant "bloom" on the molded part.

SYMPTOM

Poor cohesion—Pills are soft and crumble more or less readily on handling when preformed with normal pressure. Increasing the pressure, in an effort to make pills harder, causes sticking on ejection.

POSSIBLE CAUSES	REMEDIES
1. *Excess fines in the material.* This causes low apparent density and high bulk. Pill cannot be compressed to proper hardness even at maximum stroke and die opening.	1. Change granulation of material, increasing the coarse fractions and reducing the amount of fines. This is more feasible in the case of stock materials than with made-to-order colors, where the presence of too high a percentage of 14 and 16 mesh material may cause mottling. In preforming colored phenolic materials use where possible a rotary preformer in which the pill is compressed simultaneously from top and bottom.
2. *Tight clearance between punches and cavity walls in the preform die*—This tends to trap air in the material.	2. Increase clearance. A die clearance of 0.003 in. on one side or radius of the top and bottom punch is recommended. This clearance should be maintained for a distance of 1/2 in. along the shank from the face of each punch. Beyond this point, additional shank clearance should be provided by relieving the punch to prevent binding.
3. *Excess lubricant*—While only a small amount of lubricant is ordinarily added to the material as an aid to preforming, this may be too much under certain circumstances.	3. Reduce lubricant as required.
4. *Preforming speed is too rapid*—Field tests on single-stroke preformers have shown that at higher preforming speeds with the same pressure setting, softer pills are produced due to difficulty of removing entrapped air[1].	4. Usual practice is to operate single stroke preformers at 30 to 50 strokes per minute. On rotary preformers, a speed of 300 tablets per minute is usually recommended.

SYMPTOM

Pill weight variation—Uniform pill weight cannot be maintained within accepted tolerance without frequent adjustment of the preformer.

POSSIBLE CAUSES	REMEDIES
1. *Preforming speed is too rapid*—In this case, weight variation occurs because there is not sufficient time during the interval the feed shoe is over the cavity for powder to flow into and fill it adequately and uniformly.	1. Reduce preforming speed to 30 to 40 strokes per minute. With multiple cavity dies, use baffle plates in feed shoe to direct flow of powder uniformly to all cavities, particularly those at front of the die. See Sketches 1 and 2.
2. *Poor pourability of the material*—Instead of feeding smoothly from the hopper, the material cascades. In other cases, it bridges at the hopper throat, breaking loose and flowing irregularly. In granular material, this behavior is due to excess fines, or an improper combination of coarse and fine material. In flock-filled material, the poor pourability is caused by the fluffy texture and tendency of the fibrous particles to felt or interlace.	2. Improve granulation by providing a properly graded particle size distribution. Use magnetic vibrators on hopper and feed shoe of preformer. Inside of the hopper should have smooth polished surface. With flock-filled material, use strong, positive mechanical agitation instead of magnetic vibrator.
3. *Material has stratified in drums during shipment*—Particle size distribution is not uniform. Feed is irregular.	3. Remove part of contents and roll drums for 20 min. to 1 hr., at approximately 25 r.p.m. before using. Drum rollers can be made inexpensively.
4. *Material is removed from cavities by feed shoe on return stroke*—This phenomenon is most noticeable with flock-filled material when preformed in multiple unit dies.	4. Relieve leading edge of feed shoe to provide extra clearance between it and the die table.

[1]Recent laboratory studies by Defiance Machine Works (*Defiance Tips*, November, 1948) have also demonstrated the effect of performing speed on material cohesion and preform density.

readily and efficiently. Proper preforming behavior is, in these cases, just as important as suitable molding properties.

The material must produce hard, uniform, cohesive pills in single or multiple cavity dies, in reciprocating single stroke preformers, or in rotaries, without undue wear on die surfaces or machine bearings, and with minimum adjustment of the machine.

Three fundamentally different types of preforming troubles have distinctly different symptoms and may require different remedies. These troubles are poor cohesion; poor ejection; and erratic variation in pill weight.

These difficulties are catalogued in Table I according to the "symptoms" or effects which are observed. You will note that there may be a number of possible causes for each effect; it is frequently necessary, therefore, to examine each possibility in turn before the true cause can be determined.

Instances will be found where two of the troubles are present at the same time or where the preformer operator misinterprets the symptoms. Thus, a given material may exhibit poor cohesion. The machine operator, in an effort to produce hard pills, increases preforming pressure until finally friction between the material and the sidewalls of the die becomes excessive, because of the severe compression of the material, and poor ejection develops. This was not the real difficulty at the outset, but it may be the point stressed when the complaint is made.

In certain cases, a molding compound showing poor cohesion may exhibit non-uniformity in pill weight as well. Both of these effects may be due to the same cause, an improper particle size distribution with an excess of "fines", or material passing an 80-mesh U. S. standard screen.

Table II.—Variation in Apparent Density

Material	*Type of filler*	*Apparent density range (grams per cc)*
A	Asbestos	0.75–0.86
B	Asbestos and woodflour	0.70–0.80
C	Woodflour	0.52–0.60
D	Cotton flock and woodflour	0.39–0.44
E	Cotton flock	0.25–0.30

Magnetic vibrator attached to preformer feed hopper aids powder flow and is most useful with multiple cavity dies

PHOTOS WITH THIS ARTICLE COURTESY ROMA ELECTRIC CORP.

Preforming behavior

Over the years, a great amount of time and money has been spent by the material suppliers in laboratory and plant studies of the physical properties of phenolic molding powders, and the processing factors that control them. This has included extensive testing of grinding and blending equipment and techniques, and their effect on granulation, apparent density, pourability, and cohesion of finished molding compounds.

The problem of producing an optimum granulation would be much simpler if one were grinding an inorganic mineral substance of fairly fixed chemical composition, hardness, and friability. However, the composition and friability of phenolic molding materials and hence the particle shape, surface texture, and size distribution vary with the type and amount of resin and filler; the roll temperature, roll spacing, and rolling time used in compounding; and the moisture content of the filler.

A cotton flock material will, when ground, produce particles with softer surface and more fibrous texture than material containing a woodflour or asbestos filler. Also, any one of these materials when rolled in thin sheets and for a considerable length of time will be dense, hard, and fairly brittle in sheet form and when ground will form more jagged

particles, with a wider particle size distribution. This tends to raise the apparent density, lower the bulk factor and improve pourability, all of which are desirable effects.

Apparent density

Apparent density, referred to in the foregoing tabulation of preforming problems, is the weight per unit volume, or specific volume of the loose powder, in grams per cubic centimeter. The smaller this value, the bulkier and more flocculent the material is.

Listed in Table II are the apparent density values characteristic of commercial molding materials having cotton flock, woodflour, and asbestos fillers.

Apparent density is a property of the loose powder before molding. It should not be confused with molded specific gravity, which is a property of the molded piece. The apparent density of the loose powder depends not only on the specific gravity of the individual particles, but it is also a function of the granulation and of the percent voids or amount of free space among the particles.

It is not possible to increase the molded specific gravity of a material by incorporating asbestos or other mineral fillers without at the same time raising the apparent density, providing the same granulation is maintained. However, it is possible by suitable rolling, grinding, and blending operations which change the particle shape and percentage of fine and coarse particles present, to vary the apparent density within certain fairly wide limits, without affecting the molded specific gravity.

The following example will illustrate this: Assume that material "X" under normal molding conditions produces molded pieces with a specific gravity of 1.35 and has an apparent density in loose powder form before molding of 0.55. This means that the molded piece is 1.35 times heavier than an equal volume of water and that 1 cc. of the powder from which it was molded weighs 0.55 grams.

It is quite possible to have a second lot of material "X" identical in composition with the first which also produces a molded piece with a specific gravity of 1.35, but has an apparent density of 0.60. The individual particles of this second lot are not any heavier, but the granulation (particle size, shape, and distribution) is such that it is possible to accommodate a greater weight of material in the standard volume.

Table III.—Bulk Factor of Various Materials

Material	*Filler*	*Bulk factor*
A	Chopped fabric	10
B	Long fiber cotton flock	4.50-6.50
C	Short fiber cotton flock	4.60-5.53
D	Short fiber cotton flock and woodflour	3.10-3.50
E	Woodflour	2.27-2.62
F	Woodflour and asbestos	2.10-2.40
G	Asbestos	2.02-2.32

Table IV.—Average Particle Size Distribution in Woodflour-Filled Phenolic Material

Average granulation of general purpose phenolic material

U. S. standard screen	*% Retained*
10-mesh	0
12-mesh	0
14-mesh	1
16-mesh	6
20-mesh	35
80-mesh	45
Pan	12

The apparent density of a molding material is important to the molder. In general, he desires in any given material the highest apparent density possible since this will permit the use of preform dies and molds of minimum volume in handling the material.

Bulk factor

The bulk factor may be considered another aspect of apparent density. It is the ratio of the volume of the loose powder to that of the molded piece. It is also related to the apparent density and specific gravity according to the following simple equation:

$$\text{Bulk factor} = \frac{\text{Specific gravity}}{\text{Apparent density}}$$

This permits calculation of one of the values if the other two are known. It is also apparent from this equation that the bulk factor varies inversely with the apparent density — as the latter increases, the former decreases.

The bulk factor is higher for materials containing fibrous fillers than for woodflour-filled materials. The bulk factor range for representative commercial molding materials containing various fillers is given in Table III.

The molder desires, in general, a low bulk factor in the molding material. The same remarks apply here as in the case of apparent density — the less bulky material permits use of less expensive preform dies and molds with smaller loading space.

Pourability

The pourability of the material has decided practical importance to the molder, since, as stated previously, on many large volume molding applications the material must be preformed for fast and economical handling.

Pourability is a measure of the ease with which the loose molding powder will flow in the hopper of a preforming machine. This property is determined empirically by measuring the time in seconds required to empty a standard conical funnel

(*Please turn to page* 88)

Sales maker

SUNBEAM CORPORATION USES PLASKON MOLDED COLOR TO CATCH THE EYE AND CLOSE THE SALE FOR ELECTRIC RAZORS

WHY PLASKON?

- Strong Attraction Value
- Designed Color for Razor Housing and Display Case
- Excellent Strength
- High Electrical Insulating Qualities
- Resistance to Water, Solvents, Greases
- Ease of Molding for Distinctive Designs
- Moderate in Price

SERVICE

Experienced Plaskon Service Engineers will help adapt Plaskon Molding Compounds to your particular designing and molding problems.

FREE BOOKLET.

New full color, illustrating and describing all the advantages of Plaskon Molding Compounds.*

*Reg. U. S. Pat. Off.

PLASKON

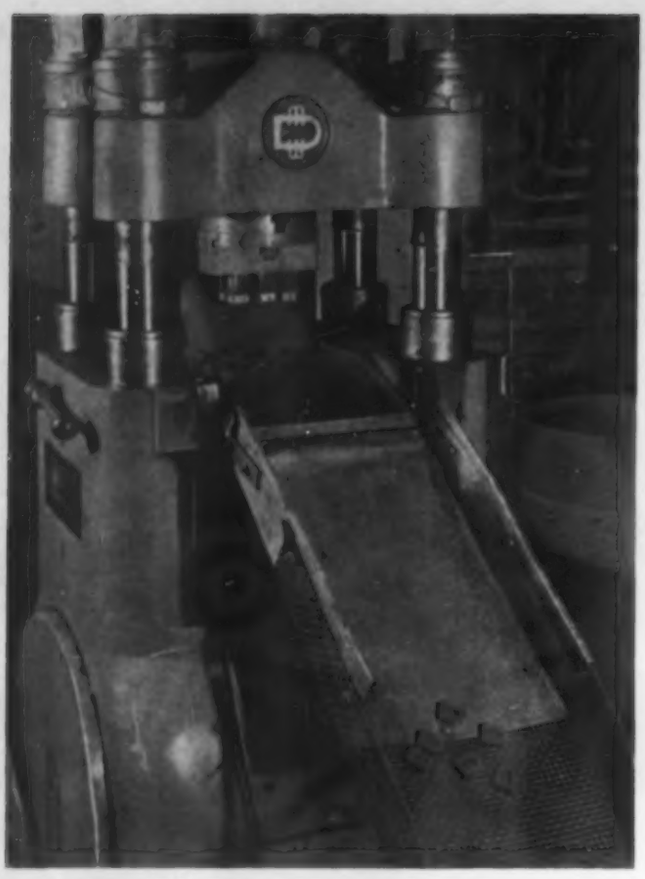
TRADE MARK REGISTERED

MOLDED COLOR

PLASKON DIVISION • LIBBEY • OWENS • FORD GLASS COMPANY
2121 Sylvan Avenue, Toledo 6, Ohio
In Canada: Canadian Industries, Ltd., Montreal, P. Q.
Branch Offices:
Boston, Chicago, Los Angeles, New York, Rochester, San Francisco
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

The Plaskon Molded Color electric shaver housing is produced for Sunbeam Corporation, Chicago, Ill., by Chicago Molded Products Corp., Chicago, Illinois

One BIGGER SINGLE Head
for FASTER WHISKER
PICK-UP
Sunbeam
SHAVEMASTER



Close control of preform weight on a six-cavity preform die is possible through use of baffle plates in feeder boot

with a ⅜-in. orifice and having sides at a 60° angle to the vertical, using a fixed weight of the molding material.

For any given material that pours readily, the rate will depend on the granulation and will be most uniform when the particle size is properly graded from fine to coarse. The average commercial woodflour-filled material will have a pourability value according to this test of from 15 to 23 sec., and the particle size distribution shown in Table IV.

Materials containing cotton flock fillers do not pour readily and pourability becomes poorer as the content of cotton flock increases. The material tends to choke or bridge in the throat of the preform hopper. Materials of this type cannot be satisfactorily handled in automatic preformers without positive agitation, unless furnished in nodular or pelleted form.

Cohesion

Probably the most difficult physical property of molding power to measure is that of cohesion. Here, again, an empirical test is used and the property is determined indirectly by measuring the hardness of pills produced under controlled conditions.

Preforms made with known pressure settings or to known density are agitated in a wire mesh tumbling barrel and rotated at a specified speed for a fixed length of time. The loss in weight of the preforms is measured, and this value used as an index of cohesion of the material.

This test may be used to measure the effect of granulation and lubricant content of the material on cohesion and hence on preforming quality. When used as a control test, the pill size and preforming speed must also be specified. Thus, that part of the preforming behavior dependent on cohesion can be specified in terms of this test by stating that the material shall show a maximum pill tumbling loss of 5% for a ⅜-in. diameter pill produced at the rate of 40 per min. under the standard tumbling conditions.

Granted, this is not an elegant, scientific test. It is, however, a practical method, an attempt to simulate under standardized conditions the handling that preforms may receive in a commercial plant.

Molding problems

Some 30 years ago, when a few intrepid souls first began to mold phenolic plastics, conditions were, according to reports, much simpler than now. Whether this was true, or only seems so in the nostalgic memories of the real oldtimers, I am unable to judge.

However, it is reported that there were only two or three molding compounds and one molding method — compression. If a job under consideration at that time couldn't be molded successfully from one of these compounds by that method, it just wasn't produced.

Further, it appears that the molder of 30 years ago, in estimating molding costs, figured on a production rate of four shots per hour, and felt he was doing quite handsomely.

Today, there are roughly 500 phenolic molding compounds. The molder can preheat these in dry ovens or steam ovens, under infra-red lamps or in dielectric preheaters. He can mold them, or attempt to, by the compression, single or double transfer, injection, or jet methods. Cure times as short as 15 sec. on certain jobs are not unheard of and 30 sec. is common practice in certain fields.

Small wonder then that the molders' problems have multiplied in almost geometric proportion with the passing years. In Table V are tabulated a few of the commonest of these troubles. However, many others will be encountered which do not exactly fit any of the categories listed. In these cases, all details directly connected with the problem should be observed carefully. Solutions are rarely found by intuition or revelation. They are the result of careful observation, common-sense analysis, and some fairly simple inductive reasoning, wherein all possible causes of the problem are tabulated and eliminated one by one until the most probable or true cause is found.

Table V.—Molding Problems.

SYMPTOM

Blistering—Blisters form, usually at the thicker sections of the molded part after the mold is opened and the piece is being ejected or as it cools.

POSSIBLE CAUSES	REMEDIES
1. *Plasticity too soft.*	1. Increase cure time, if possible; otherwise, use material of stiffer plasticity.
2. *Molding temperature too low*—This may be due to: Insufficient heat source. Poor heat transfer because of blocked steam channels, defective trap, poor contact between heating platens and mold. Excessive heat loss by conduction to press platens or by radiation.	2. Remedies here are self-evident once cause of trouble is found. Recommended molding temperatures for average general purpose material are 300-340° F. Temperatures of 360° F. and sometimes higher are frequently used on small parts requiring only short flow in order to obtain fast cure. Insulate mold from press platens with transite board or similar insulant.
3. *Excess volatile matter*—This may be moisture or various gaseous by-products such as ammonia and formaldehyde evolved during cure.	3. Preheat material at 180 to 200° F. for 5 to 30 minutes. Time to be used must be determined by trial. Gas release or breathe the mold a few seconds after closing. This procedure is most satisfactory on flat shallow parts. It is not recommended for deep, intricate parts, parts having large or numerous inserts, and molds with horizontal core pins.
4. *Mold clearance too tight*—This refers primarily to semi-positive molds. With these, if clearance between force and cavity is small (0.002 in. or less) blistering due to trapped gases may occur, even when material of proper plasticity and volatile content is molded at correct temperature and pressure.	4. Increasing clearance between force and cavity frequently will minimize or eliminate the trouble. Where this is not permissible, grinding vents or relief channels at edges of cavities, 0.005 to 0.010 in. deep, will frequently relieve the condition. Providing slight vents around knockout pins often helps.

SYMPTOM

Porosity, sink marks, lack of fill—Molded piece has dull, rough surface and porous areas near top. In less severe cases, molded pieces, while filled out and showing fair to good surface gloss, show sink marks in surface and heavy flash.

POSSIBLE CAUSES	REMEDIES
1. *Plasticity too stiff.*	1. Use softer plasticity.
2. *Apparent density too low.*	2. This is noticed when multiple cavity molds are loaded with loose powder by means of loading boards or cups of fixed volume. When apparent density is too low, the quantity of material is insufficient to fill out the piece. Add extra material by hand to the board or mold and note if properly filled out pieces are obtained without heavy flash. If so, flow is satisfactory but apparent density is too low and must be increased unless you can persuade the molder to change his loading board.
3. *Insufficient molding pressure*—Line pressure is too low or projected area of mold too great; or available molding pressure is dissipated on "lands" or other similar parts of the mold.	3. Increase molding pressure or modify mold to apply more of available pressure on material. Molding pressure of 2500 p.s.i. minimum on projected part area plus lands is usually recommended.
4. *Mold temperature too low*—Too great a temperature difference between the two halves of the mold.	4. Increase mold temperature. Temperature difference in mold should not usually exceed 10° F.
5. *Insufficient charge of material*—An obvious cause, but apt to be overlooked in changing from a woodflour-filled material to an asbestos material on a given part. A larger weight of the latter must be used to produce part of same molded volume.	5. Increase material charge and see if filled out parts are obtained.
6. *Excessive or non-uniform preheating*—This is an obvious cause which will be readily apparent to you. It should be noted, however, that electronic preheating is considerably more critical than other methods and a few seconds extra preheating by this method may decrease flow of the material markedly.	6. The remedy is also obvious—decrease the amount of preheat and observe effects on flow. Where there is evidence of non-uniform preheating using the electronic method, care should be taken to make sure that the electrodes are clean and dry, that the top electrode is parallel to the top surfaces of the preforms, and that these latter are as nearly as possible equal in density and located well within the field of the two electrodes.
7. *Lack of vents*—This refers to transfer molds. In these, because of close fits, there is frequently a tendency to trap air or other volatile matter at the extremities of the mold opposite the gate. Unless suitable vents are provided, pieces may not fill out at this point.	7. Practice varies in this respect. The usual recommendation is that such vents be on the edges of the cavities and have a depth of 0.005 to 0.010 in. and a width of 1/16 to 1/8 inch.

(Table continued on next page)

Table V.—Molding Problems (Continued)

SYMPTOM

Staining and sticking—This bugbear that haunts the lives of molders and material suppliers appears with annoying frequency, and the possible causes are as numerous as the symptoms are varied. These troubles can appear alone or in combination. In the more usual cases, the following signs are noticed: a) Deposit accumulates on mold surface and produces dull areas on the molded part. In later stages, it is difficult or impossible to remove part from the mold without cooling excessively or even breaking it up.

POSSIBLE CAUSES	REMEDIES
1. *Mold surface is oxidized or corroded*—This most frequently occurs when the mold has been left idle with heat on, or at room temperature without being greased to prevent corrosion.	1. Polish mold well, lubricate freely, blow out, and start over. Purposely overcure the first six shots after polishing.
2. *Insufficient or soft cure*—Reasons why this causes sticking are obscure but the evidence from field tests is strong that it does. Many theories have been advanced, but no thoroughly satisfactory explanation has yet been found, and it is difficult to duplicate and study this condition outside the mold.	2. Increase the cure time where practicable. When this cannot be done, try a stiffer plasticity in the given material, or another material having a faster cure and more rigid set. A cure longer than the bare minimum required to prevent blisters will also improve mechanical strength and electrical properties, reduce shrinkage, and decrease the amount of free phenol in the finished parts.
3. *Effect of asbestos and mica fillers*—These fillers are not absorbent, not as readily wetted by the resin as woodflour, and do not, therefore, cover as well; they show a definitely greater tendency toward sticking.	3. Compounds containing these fillers must be carefully formulated to improve mold release. Special attention must be given to the amounts and type of lubricant used. Use molding temperatures of 300 to 320° F., if possible.
4. *Too high mold temperature*—Here, again, the evidence is strong, but the explanation weak, and the answer difficult since one cannot see or make measurements within the mold during the molding operation. There is ample evidence, however, of a greater tendency toward staining at higher mold temperatures, particularly when cure time is short, as is usually the case.	4. Mold, wherever practicable, at 320 to 360° F.
5. *"Dead spots" in the mold*—Staining tendencies due to causes listed above are increased if the part has bosses or other projections which are formed in blind holes in the mold. There is little material flow at these points and staining readily occurs. Excess lubricant which may carbonize on prolonged exposure to high mold temperatures is also a possible trouble maker.	5. Design the part and the mold to eliminate these dead spots where possible and to aid flow of the material. In molding, place the charge in the mold so as to cause maximum plastic flow of the material and strong wiping action across the mold surface, without damaging pins and inserts.

b) Sticking occurs without any progressive staining. In severe cases the mold may refuse to open.

1. *Overloaded mold*—This usually occurs with large semi-positive molds, when starting up or when changing from one material to another of lower specific gravity. Excess material is squeezed out into the vertical clearance space and causes binding.	1. Caution is the principal remedy here. Take account of specific gravity differences when determining correct mold charge.
2. *Insufficient taper*—Taper or draft is usually provided on sidewalls and holes, but may not be sufficient.	2. Taper of 1/2 to 1° is usually recommended.
3. *Undercuts—tool marks, bent pins, mushroomed pins, etc.* These are self-evident but sometimes unnoticed causes of sticking. There may or may not be evidence of these undercuts on the piece.	3. Only remedy is to remove these undercuts and polish the mold.
4. *Dowel pins*—These may be rusted, galled, or insufficiently lubricated, causing them to bind in the holes. Or, in other cases, excess clearance may have developed between pins and bushings due to wear, permitting force plug to shift and causing sticking or binding in the mold cavity.	4. Dowel pins should be properly maintained and any undue clearance corrected.

SYMPTOM

Flow marks—The part shows irregular, wavy surface lines and excessive "orange peel" or pebbly surface texture. Gloss is poor.

POSSIBLE CAUSES	REMEDIES
1. *Excess moisture in material.*	1. Preheat at 180 to 200° F. for 5 to 30 minutes.
2. *Plasticity too soft*—Flow in the mold is too rapid and material tends to escape on closing. Flash is very thin and sufficient back pressure is not developed in the mold.	2. Preheat material for longer interval. Hold mold on low pressure for 3 to 5 sec. before applying high pressure and closing. Use stiffest plasticity possible without producing heavy flash and damaging inserts.

(Table concluded at top of next page)

Table V.—Molding Problems (Continued)

SYMPTOM

Warpage—Another bane of the molder's existence, which scarcely needs further definition here.

POSSIBLE CAUSES	REMEDIES
1. Non-uniform shrinkage due to:	1.
Temperature differences in the mold.	Equalize mold temperatures.
Incorrect design—difference in wall sections in closely adjacent sections of the part; presence of large, flat, unsupported areas.	Redesign part—core out sections wherever possible. Crown all flat areas and use supporting ribs and fillets.
Low mold temperature	Increase temperature.
Insufficient cure time.	Cure part more completely.
Non-uniform cooling.	Cool uniformly on fixtures.
Use of material too soft in plasticity.	Use stiffer plasticity.
2. *Heat distortion point of material too low.*	2. Material should be modified where possible to produce more rigid final set.
3. *Improper location or non-uniform action of knockout pins.*	3. Locate knockout pins symmetrically; adjust uniformly.

SYMPTOM

Mottling and non-uniform color—This occurs at times in brown and even in black materials, but occurs usually with lighter-colored phenolic materials.

POSSIBLE CAUSES	REMEDIES
1. *Excess moisture.*	1. Preheat as directed above.
2. *Non-uniform mold temperature.*	2. Maintain uniform temperature ±50° F. throughout mold.
3. *Granulation of material too coarse.*	3. Use material which passes U. S. #16 mesh screen.

SYMPTOM

Precure—The molded part shows a dull surface with widely distributed gray spots.

POSSIBLE CAUSES	REMEDIES
1. *Mold temperature too high*—Finer particles in the powder charge are cured by contact with the hot mold surface before pressure can be applied.	1. Use lower mold temperature; a temperature of 300 to 320° F. is recommended.
2. *Loading and closing time too long*—Particularly evident when a multiple cavity mold is loaded with individual loose powder charge one at a time.	2. Use preforms or a loading board. Close mold as rapidly as can be done without damaging pins or fragile sections. If closing time cannot be shortened, use softer plasticity material; being less far advanced, it will have less tendency to precure.
3. *Excess fines in material.*	3. Remedy is self-evident—reduce fines content. If, however, precautions suggested above are observed, the fines content of the usual commercial molding compounds will be found satisfactory.

This may be merely a quick mental inventory or it may require considerable testing, extending over a number of hours or days, if the customer's patience lasts that long. In either case, however, the approach is the same. Suggested steps are:

1) Observe the operation of the mold and material yourself, whenever possible. Avoid second or third hand reports which are usually sincere and truthful, but may be inaccurate concerning important details, and incorrect in interpretation.

2) Check mold and molding conditions and make sure that these are correct, insofar as you can determine. Mold some other material beside the one being used, to determine if the mold is operating properly and will produce satisfactory pieces.

3) Once this is determined, proceed with further tests in an orderly manner and record your results. These further tests will usually follow one or both of the following procedures:

a) Test one material under various molding conditions to find the optimum conditions for the particular job, with that material.

b) Test a number of materials under these optimum conditions, to compare performance and to find the one that works best on the job.

4) Don't change more than one variable at a time. If you do, you won't be able to identify effect with cause and may spend hours wandering futilely in a maze of conflicting results.

5) Don't make changes in rapid succession. Wait for each change to take effect and for equilibrium to be established. This is particularly true of temperature changes.

Much more could be said concerning molding problems created by part design and mold design. However, the symptoms, causes, and cures that have been detailed here should be of help and next time a molding job begins to go haywire and a gremlin peers around the press, cackling fiendishly at the frantic efforts being made to set it straight.

Another New-Business-Getter for You...

On the opposite page is another recent Cyanamid Plastics advertisement—Number Two of a new campaign now appearing in such publications as FORTUNE, MODERN INDUSTRY, DESIGN NEWS and PLASTICS WORLD to help increase productivity, sales and profits for molders of thermosetting plastics. (There are *a lot* of very fine prospects in the more than 400,000 readers reached regularly by this campaign.)

These advertisements do much more than *reach* prospects and customers. They *stop* manufacturers and materials buyers with product illustrations that are both colorful and rich in detail—then tell about how adaptable Cyanamid Plastics are for new applications and designs—what excellent mechanical, physical and electrical properties they possess—and how fast these low-cost compounds can be molded.

Point out to your salesmen that *some* of the 400,000 who've been "presold" by this advertisement are in *their* territories, and may now be in a mood to talk business.

• • • • • •

PLASTICS NEWSFRONT (now with more than 15,000 interested readers) is devoted to *your* interests, too. It is filled with stories about new ideas, new designs, new uses and successful applications of our laminating and adhesive resins and molding compounds. Climb aboard ... send in the coupon today.

If you are not receiving this ...just fill in this

The Editor—PLASTICS NEWSFRONT
American Cyanamid Company
32 Rockefeller Plaza, New York 20, N. Y.

Please put my name on your list immediately to receive PLASTICS NEWSFRONT. I understand that there is no charge or obligation.

Name_____

Company_____

Title_____

Address_____

_____

Westclox Travalarm . . .
case molded of BEETLE FC (fast-cure) by Kurz-Kasch, Inc.

For long-time best sellers

BEETLE* Plastic helps sustain sales and reduce costs

After years of service, the original molds for the case of the Westclox Travalarm are still in quantity production and demand for Travalarms is as great as ever. An enviable record of how to get the most for your plastics dollar. (Just one example of what BEETLE is doing for a wide range of products . . . and, possibly, can do for your product.)

And *now* . . . for many manufacturers . . . the new *fast-cure* BEETLE Plastic is increasing production by reducing cure time as much as 45% to 68%.

That, of course, is not all . . . products made with Cyanamid's BEETLE turn out in rich sales-making colors that are permanent. Such products are resistant to shock; they won't shatter, chip or catch fire; they are not harmed by cleaning fluids or common solvents.

We will be glad to give you complete information about fast-cure BEETLE Plastic for your product . . . and to help you locate a well-experienced, well-equipped molder in your vicinity. Just write to Plastics Department, American Cyanamid Company, 32 Rockefeller Plaza, New York 20, N. Y.

AMERICAN Cyanamid COMPANY

PLASTICS DEPARTMENT
32 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

* Reg. U. S. Pat. Off.

BEETLE* plastics – urea-formaldehyde thermosetting molding compounds. MELMAC* plastics – melamine-formaldehyde thermosetting molding compounds, industrial and laminating resins. URAC* resins – urea-formaldehyde thermosetting industrial resins and adhesives. MELURAC* resins – melamine-urea-formaldehyde thermosetting resin adhesives and laminating resins. LAMINAC* resins – thermosetting polyester resins.

FILLER-FORTIFIED WITH CLAREMONT FLOCK

Shown here, assembled — Eight Rotor Blades, part of an air speed indicator, as precision engineered and processed for the Friez Instrument Division of Bendix Radio Corporation by American Insulator Corporation, New Freedom, Pa. To insure required high impact strength, molder used Durez 1544—fortified with a selected Claremont Cotton Filler.

strange but true!...The Good that a Claremont Filler Does, Comes to "Life"—after its "Burial"

In this way, the filler, mixed with the formulation, becomes uniformly distributed in the molding charge, forms a network of sinewy girders in the compound and thereby produces the strength necessary to end-use performance.

Samples of Claremont Cotton Fillers (flock, thread, fabric, cord) in quantities sufficient for laboratory tests, are available upon request. Your inquiry is invited!

CLAREMONT
FLOCK
THREAD
FABRIC
CORD

CLAREMONT
THE FILLER IS THE HEART
WASTE MANUFACTURING CO.
"The Country's Largest Manufacturer of Flock" CLAREMONT, N. H.

Adhesives for Phenol-Formaldehyde Laminates

by LUCIUS GILMAN* and STANLEY J. LOWELL*

ADHESIVES have widespread utility in the preparation of assemblies from phenol-formaldehyde laminates, and those which set or cure at room temperature are more convenient to use than those requiring application of heat. Detailed information concerning the performance which can be expected from materials of this type has not been available, and accordingly this investigation was undertaken in order to provide data on which to base predictions of performance in service. The investigation has been limited to bonds involving phenol-formaldehyde laminates and to adhesives which set or cure at room temperature.

Materials investigated

All known, commercially available phenol-formaldehyde[1] adhesives were subjected to preliminary investigation. The results in Table I show a considerable variation in shear strength among these materials. On the basis of these results it appears that adhesive No. 1 used with primer was outstanding. This combination was selected for more extensive testing. Since in many applications it would be preferable to use an adhesive without primer, the best of the materials without primer, adhesive No. 2, was also given more extensive testing. Adhesive No. 1 was subsequently identified as a resorcinol-containing material and adhesive No. 2 as a phenolic material. In the remainder of this article, these are called Resorcinol A and Phenol A, respectively.

Experimental procedures

Most of the evaluation was based upon shear strength determinations, and a standard procedure was adopted for the preparation of specimens. Commercial Grade C phenol-formaldehyde laminated sheet ⅛ in. thick was used. The surface of the laminate was washed with toluene, wiped with a clean dry cloth, and allowed to dry at room conditions. Adhesive or primer and adhesive were prepared and applied as directed by the manufacturer. An open assembly time of 5 to 10 min. and a closed assembly time (time elapsing between mating of the strips and the application of pressure on the bonded area) of 5 to 10 min. was used. Unless otherwise indicated the pressure exerted on the bonded areas during cure was 8 to 12 p.s.i. for at least 16 hours. Curing was then completed under no pressure for a total curing time of 7 days. Unless otherwise specified, all curing was at 25° C. and 50% relative humidity. All calculated standard deviations were corrected for small sample size.

For determining static shear strength, test strips 1 by 3.5 in. were cut from the fabric base phenol-formaldehyde laminate ⅛ in. thick. A hole ¼ in. in diameter was drilled through each test strip approximately ¾ in. from one end and in the center of the strip. Steel pins having a diameter slightly less than ¼ in. were inserted through the holes of the test specimens and were passed through holes in the grips on each side of the specimen. Tests were conducted at 25° C., 50% relative humidity. A standard motor driven type universal testing machine was used and was adjusted to give a rate of stressing of approximately 800 p.s.i./minute.

For determining impact shear strength, phenol-formaldehyde laminated specimens 1 by 0.5 by 0.25 in. were prepared, bonded together at the non-machined surfaces, and cured under standard conditions. The bonds were then tested for shear impact in an Izod type impact machine. A 50 in.-lb. pendulum was used with a steel plate attached on the front of the head to act as the striking plate. The bonded specimen was positioned in the vise so that the glue line was even with the top of the vise.

For determining tensile strength, specimens were machined from phenol-formaldehyde laminated rod so that the surfaces to be bonded were 1⅛ in. in diameter and the shoulders which were held in specially constructed grips were 1⅞ in. in diameter. The specimens were prepared, bonded, cured, and

*Ordnance Dept., Picatinny Arsenal Plastics Laboratory, Dover, N. J.

[1] No attempt is made in connection with the materials in Table I to distinguish between phenol-formaldehyde, modified phenol-formaldehyde, and resorcinol-formaldehyde resins. All are grouped together under the term phenol formaldehyde.

Table I.—Shear Strength of Phenol-Formaldehyde Adhesives[a] with Grade C Phenol-Formaldehyde Laminate.[b]

Adhesive No.	*Shear strength*[c]	*Group 1*	*Group 2*	*Group 3*
1 (with primer)	Minimum, p.s.i.	946	940	594
	Maximum, p.s.i.	1120	1220	830
	Average, p.s.i.	1035	1140	723
	St. dev., p.s.i.	52	110	89
1	Minimum, p.s.i.	374	0	.....
	Maximum, p.s.i.	510	166	.....
	Average, p.s.i.	[d]	[d]	.....
	St. dev., p.s.i.	[d]	[d]	.....
2	Minimum, p.s.i.	236	150	150
	Maximum, p.s.i.	354	480	250
	Average, p.s.i.	298	217	187
	St. dev., p.s.i.	37	107	120
3	Minimum, p.s.i.	280	166	.....
	Maximum, p.s.i.	550	306	.....
	Average, p.s.i.	421	197	.....
	St. dev., p.s.i.	129	32	.....
4	Minimum, p.s.i.	166	114	0
	Maximum, p.s.i.	300	164	272
	Average, p.s.i.	242	134	86
	St. dev., p.s.i.	45	17	98
5	Minimum, p.s.i.	210	146	0
	Maximum, p.s.i.	476	274	282
	Average, p.s.i.	343	217	91
	St. dev., p.s.i.	119	49	103
6	Minimum, p.s.i.	250	10	.....
	Maximum, p.s.i.	824	10	.....
	Average, p.s.i.	537	10	.....
	St. dev., p.s.i.	[d]	[d]	.....
7	Minimum, p.s.i.	48	.....	.....
	Maximum, p.s.i.	138	.....	.....
	Average, p.s.i.	102	.....	.....
	St. dev., p.s.i.	33	.....	.....
8	Minimum, p.s.i.	144	30	.....
	Maximum, p.s.i.	276	210	.....
	Average, p.s.i.	212	120	.....
	St. dev., p.s.i.	49	67	.....
9	Minimum, p.s.i.	0	620	.....
	Maximum, p.s.i.	666	632	.....
	Average, p.s.i.	365	626	.....
	St. dev., p.s.i.	67	[d]	.....
10	Minimum, p.s.i.	0	.....	.....
	Maximum, p.s.i.	286	.....	.....
	Average, p.s.i.	169	.....	.....
	St. dev., p.s.i.	133	.....	.....

[a] No attempt is made in this table to distinguish between phenol-formaldehyde, modified phenol-formaldehyde, and resorcinol-formaldehyde adhesives.
[b] Federal Specification HH-P-266 Grade C, Type II, ⅛ in. thick.
[c] Each group consisted of assemblies prepared from a different mix of adhesive/catalyst and assembled on a different day. Assemblies were cured seven days at 25° C., 50% relative humidity, and tested at 25° C. The standard deviations were corrected for small sample size.
[d] Insufficient data.

Table II.—Shear Strength of Bond at —53° C.

Adhesive	*Shear strength*			
	Minimum	*Maximum*	*Average*	*St. dev.*
	p.s.i.	*p.s.i.*	*p.s.i.*	*p.s.i.*
Resorcinol A/Primer A	936	1180	1067	98
Phenol A	109	442	275[b]	[c]

tested under the standard conditions. The testing machine was adjusted to give a rate of loading of approximately 600 p.s.i./minute.

Performance of adhesives

The average shear strength obtained with Resorcinol A/Primer A was 944 p.s.i. with a standard deviation of 150. Out of 145 tests shown in Tables I and XV, the lowest single value was 590 p.s.i; 95% of the specimens gave shear strength values greater than 700 p.s.i. The average shear strength obtained with Phenol A was 301 p.s.i. with a standard deviation of 71; 90% of the specimens gave shear strength values greater than 200 p.s.i.

The data in Table II show that the shear strength of Resorcinal A/Primer A at —53° C. is about the same as that at room temperature and that the shear strength of Phenol A is very greatly increased at this lower temperature. Minimum tensile strengths of 780 p.s.i. for Resorcinol A/Primer A and of 1020 p.s.i. for Phenol A were obtained at room temperature as shown in Table III.

Resorcinol A/Primer A showed a very high resistance to alternate soaking and drying, being unaffected by 10 cycles, each of which consisted of two days' soaking in water at 25° C followed by five days' drying in a desiccator at room temperature. This amount of drying brought the assembly back to its original weight. Phenol A was affected by this treatment in a very irregular manner, part of the assemblies falling apart after as few as two cycles while one assembly showed a shear strength of 442 p.s.i. at the end of 10 cycles. These data are given in Table IV.

As shown in Table V, both adhesives were unaffected by strong ester solvent or by strong aromatic type solvent. Specimens were immersed in triacetin and in nitrobenzene until saturated, but

Table III.—Tensile Strength of Bond at 25° C.

Adhesive	*Tensile strength*			
	Minimum	*Maximum*	*Average*	*St. dev.*
	p.s.i.	*p.s.i.*	*p.s.i.*	*p.s.i.*
Resorcinol A/Primer A	780	1030	878	112
Phenol A	1020	1310	1170	112

Table IV.—Effect of Wet and Dry Cycles[a] on Shear Strength of Bond.

Adhesive	*Shear strength*			
	Minimum	*Maximum*	*Average*	*St. dev.*
	p.s.i.	*p.s.i.*	*p.s.i.*	*p.s.i.*
Resorcinol A/Primer A	936	1180	1067	98
Phenol A	109	442	275[b]	[c]

[a] One cycle consisted of two days' immersion in water and five days' drying in a desiccator (to original weight). Ten cycles were completed in this test.
[b] Of the five assemblies tested, one bond separated at the end of the second cycle, another at the end of the third cycle, and another at the end of the seventh cycle.
[c] Insufficient data.

Table IX.—Effect of Ambient Temperature on Working Life of Adhesive.

Adhesive	Ambient temperature	Exposure time	Shear strength			
			Minimum	Maximum	Average	Standard deviation
	°C	hr.	p.s.i.	p.s.i.	p.s.i.	p.s.i.
Resorcinol A/Primer A	37.8	1.5	Mixture polymerized			
	37.8	1	940	1060	990	50
Phenol A	37.8	2	Mixture polymerized			
	37.8	1.5	250	320	288	10
Resorcinol A/Primer A	25	3.5	Mixture polymerized			
	25	3	1020	1140	1082	46
Phenol A	25	4.5	Mixture polymerized			
	25	4	250	340	292	37

no lowering of shear strength resulted from these treatments.

Resistance to elevated temperature for a prolonged period of time is summarized in Table VI, both adhesives showing greatly increased tensile and impact shear strength after being stored for 1 to 24 weeks at 77° C.

Factors affecting strength of bond

It is apparent from the data that there is considerable variation in bond strength from specimen to specimen. It was found that details of the assembly procedure and details in preparing the materials affect the strength of the bond. Some of these variations in procedure have relatively little influence on bond strength while others show a very marked affect.

Among the variations which did not require close control were pressure, temperature of cure, and time elapsed between mixing the adhesive and using it. This came as a considerable surprise, since it had been anticipated that the results obtained would be very sensitive to all these variables. The data in Table VII show that contact pressure gives shear strengths which vary little or none from those of specimens prepared by the standard procedure under about 10 p.s.i. pressure. The data in Table VIII show that the adhesives cure essentially as well in seven days at temperatures down to 5 to 10° C. as at 25° C., and the values in Table IX show that the adhesives gave as satisfactory results up to within

Table V.—Effects of Solvents on Shear Strength of Bond.

Adhesive	Shear strength			
	Minimum	Maximum	Average	St. dev.
	p.s.i.	p.s.i.	p.s.i.	p.s.i.
Resorcinol A/Primer A				
Nitrobenzene	900	980	948	30
Triacetin	920	1060	972	65
Phenol A				
Nitrobenzene	380	450	413	32
Triacetin	380	530	454	60

Table VIII.—Effect of Reduced Curing Temperature on Shear Strength of Bond.

Adhesive	Shear strength			
	Minimum	Maximum	Average	St. dev.
	p.s.i.	p.s.i.	p.s.i.	p.s.i.
Resorcinol A/Primer A				
Cured 7 days at 17° C.	670	860	753	66
Cured 7 days at 5-10° C.	840	1090	991	84
Phenol A				
Cured 7 days at 17° C.	320	410	363	144
Cured 7 days at 5-10° C.	220	360	282	59

Table VII.—Shear Strength of Bond Formed at Contact Pressure[a].

Adhesive	Shear strength			
	Minimum	Maximum	Average	St. dev.
	p.s.i.	p.s.i.	p.s.i.	p.s.i.
Resorcinol A/Primer A	810	910	865	44
Phenol A	184	530	301	128

[a] Seven days' closed assembly without pressure.

Table VI.—Effect of Storage at 77° C. (170° F.) on Strength of Bond.

	Minimum	Maximum	Average	St. dev.
Shear strength after 24 weeks at 77° C.				
Resorcinol A/Primer A, p.s.i.	1100	1200	1147[a]	35
Phenol, p.s.i.	1000	1200	1086[b]	83
Impact shear strength after 0 weeks at 77° C.				
Resorcinol A/Primer A, ft.-lb./sq.in.	5.0	8.2	6.4	1.2
Phenol A, ft.-lb./sq.in.	0.2	0.6	0.4	0.1
Impact shear strength after 1 week at 77° C.				
Resorcinol A/Primer A, ft.-lb./sq.in.	5.8	6.1	6.0	[c]
Phenol A, ft.-lb./sq.in.	2.0	3.0	2.5	[c]
Impact shear strength after 2 weeks at 77° C.				
Resorcinol A/Primer A, ft.-lb./sq.in.	9.0[d]	9.0[d]	9.0	[c]
Phenol A, ft.-lb./sq.in.	2.0	3.0	2.5	[c]
Impact shear strength after 6 weeks at 77° C.				
Resorcinol A/Primer A, ft.-lb./sq.in.	6.0	8.0	7.0	[c]
Phenol A, ft.-lb./sq.in.	2.0	3.0	2.5	[c]

[a] The laminates of all six assemblies tested broke; bonds remained intact.
[b] Laminates of four of six specimens tested broke; bonds remained intact.
[c] Insufficient data.
[d] The laminate of the assembly broke; bond remained intact.

Table X.—Effect of Catalyst Ratio on Shear Strength of Bond.

Resin catalyst ratio	Shear strength			
	Minimum	Maximum	Average	St. dev.
	p.s.i.	p.s.i.	p.s.i.	p.s.i.
Resorcinol A/Primer A				
83:17 (prescribed by manufacturer)	830	1020	918	82
78:22	600	780	723	53
88:12	750	950	878	76
Phenol A				
85:15 (prescribed by manufacturer)	300	410	354	86
80:20	340	460	388	51
90:10	270	380	328	46

Table XI.—Effect of Open Assembly Time on Shear Strength of Bond.

Open assembly time	Shear strength			
	Minimum	Maximum	Average	St. dev.
min.	p.s.i.	p.s.i.	p.s.i.	p.s.i.
Resorcinol A/Primer A				
1-5	780	1020	888	107
1-5	680	800	746	48
1-5	770	1030	953	96
15-20	540	880	732	139
15-20	560	750	670	79
15-20	660	970	797	123
Phenol A				
1-5	244	336	292	38
15-20	180	250	210	30

Table XII.—Effect of Surface Treatment of Laminate on Shear Strength of Bond[a].

Treatment of laminate prior to bonding	Shear strength			
	Minimum	Maximum	Average	St. dev.
	p.s.i.	p.s.i.	p.s.i.	p.s.i.
1. Cleaned with dry cloth	390	590	508	75
2. Cleaned with cloth wet with toluene	640	760	702	48
3. Washed in toluene and wiped with dry cloth	770	1030	953	96
4. Washed twice in toluene and wiped with dry cloth	780	910	833	60
5. Roughened with emery cloth and then treated as in (3)	750	890	800	51

[a] Resorcinal A/Primer A was used as the adhesive in this test.

Table XIII.—Shear Strength of Bonds Formed with Different Laminates[a].

Laminate grade[b]	Shear strength			
	Minimum	Maximum	Average	St. dev.
	p.s.i.	p.s.i.	p.s.i.	p.s.i.
Resorcinol A/Primer A adhesive				
XXX	720	800	700[c]	36
XP	1020	1200	1116[d]	68
C-1	770	1030	953	96
C-2	700	1050	898	137
C-3	680	780	750	36
C-4	600	770	696	75
C-5	730	750	743	9
LE	1260	1370	1324	47
L	1120	1200	1166	30
Phenol A adhesive				
XXX	440	704	562	120
XP	400	720	500	143
C	300	410	354	46
LE	520	740	622	79
L	400	660	483	110

[a] All laminates were $\frac{1}{8}$ in. thick.
[b] The numbers indicate groups of specimens taken from different panels of the same grade.
[c] The laminates of all five assemblies tested broke; bonds remained intact.
[d] The laminates of four of the five assemblies tested broke; bonds remained intact.

0.5 hr. of the end of the pot life of the material as they did earlier in the life of the mix. For this latter set of experiments, pot life was determined at two different temperatures, the end of pot life being taken as the time at which the adhesive gelled in the pot and could no longer be spread. Adhesive taken from the pot 30 min. before the end of pot life gave bonds as strong as those formed by freshly mixed adhesive.

A second group of variables was found to affect shear strength extensively, but these were all variables which can readily be controlled. In this second category are included catalyst ratio, open assembly time, condition of the surface of the laminate, type of laminate, and clearance or space between the two pieces of laminate being bonded. Examination of the data in Table X shows that Resorcinol A/Primer A is unaffected by a 5% decrease in ratio of catalyst to resin but is adversely affected by a 5% increase in this ratio. Phenol A is less sensitive to this variable and is unaffected by either an increase or decrease of 5 percent. Open assembly time is defined as the time between application of the adhesive and closing the assembly to form the bond. The data in Table XI show that open assembly times as great as 15 to 20 min. have an adverse effect upon the shear strength obtained with either of these materials and that the open assembly time should probably not exceed 5 minutes.

Contrary to expectations, roughening the surface of the laminate with emery did not produce the highest strength bonds. The data in Table XII show that the most successful surface preparation consisted of washing the laminate with toluene, wiping with a clean cloth, and allowing to air dry. Simply wiping with a dry cloth or wiping with a cloth wet with toluene were insufficient to produce the best results. On the other hand, washing twice with toluene produced no advantage over washing once.

Considering variation in the laminate, the results with Grade XXX laminate are inconclusive because the laminate broke before the bond failed, but it appears that shear strengths obtained with Grades XXX, XP, L, and LE are higher than those obtained

(*Please turn to page* 132)

Something New in "store windows"...

Envelopes—with windows of optically clear Kodapak Sheet—provide a wealth of new possibilities for protective counter display.

Windows made of this brilliant, highly transparent plastic sheet display merchandise in true colors and textures . . . keep it clear, fresh, free from shop wear. Kodapak Sheet is tough and durable, too . . . gives excellent protection against fingering and handling.

Kodapak Sheet is made in two principal forms: Kodapak I, cellulose acetate, in gauges up to 20 thousandths (0.020″). Kodapak II, cellulose acetate butyrate, in gauges up to No. 200 (0.00200″).

If you want to learn more about this packaging material, the Kodapak Demonstration Laboratory in Rochester is available to demonstrate fabrication possibilities and practical end uses.

Cellulose Products Division

Eastman Kodak Company, Rochester 4, N. Y.

FOR THE DISPLAY YOU WANT . . . THE PROTECTION YOU NEED

Kodapak Sheet

"Kodapak" is a trade-mark

Kodak

HERESITE

REG. U. S. PAT. OFF.

M-66 Transparent Amber Molding Compound

Illustrated are a variety of parts molded from M-66 Transparent Amber Phenolic Molding Compound. Its transparency, coupled with complete resistance to sterilization temperatures, makes it ideal for many applications in the dairy industry and hospital equipment field.

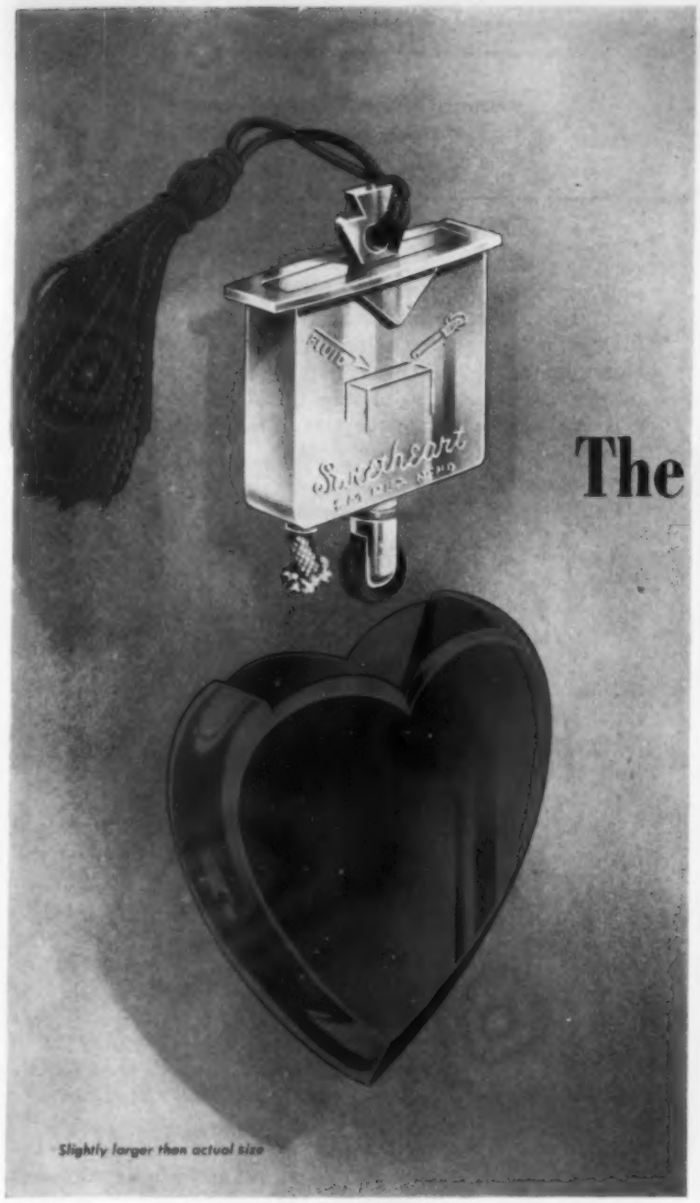
The molding of the M-66 requires no unusual skill, or technique to obtain satisfactory results. It may be molded to close tolerances by either the compression or transfer method.

AVAILABLE IN VARIOUS COLORS

For additional information write

HERESITE & CHEMICAL COMPANY

MANITOWOC, WISCONSIN



Slightly larger than actual size

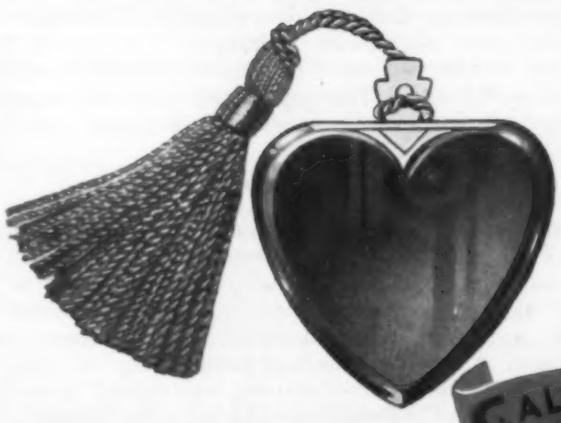
"One Heart that Beats as Two"

The Heart of this Lighter is Plastic!

It also Doubles as a Protective and Glamorous Slipover to a Perfume Vial—

WE'VE A SOFT SPOT in our *hearts* for this novel little product—*first*, because of the part plastic plays in its sales appeal . . . and *secondly*, because the account for whom we molded it, welcomed and acted upon many of the cost-saving suggestions advanced by our design engineers. The item as you might judge from its size (about that of a half dollar coin), was injection molded in a Consolidated-built 12 cavity die . . . with a double side rig permitting the formation of the inner slots.

And we've a soft spot in our *hearts* too, for any and all plastics projects—be they simple or involved, large or small, for hidden service or show, whether industrial, electrical or novelty applications. Our seventy-five years' custom molding experience guarantees a quality product . . . properly processed, functionally correct. May our sales-engineering staff counsel with you? Inquiries invited!



"Sweetheart Lighter"—as produced by Consolidated for Curry Arts of Scranton, Pa. The item, molded of acetate, is available in selected bright colors. It is being nationally advertised . . . so when you read its romantic message — remember Consolidated molded the *heart* of its story!

CALL IN **Consolidated**
MOLDED PRODUCTS *Corporation*
309 CHERRY STREET,
SCRANTON 2, PA.

CMP
Your Blueprint in Plastic

Branches: NEW YORK, 1790 Broadway • GLEN ELLYN (suburb Chicago, Ill.), 749 Crescent Blvd • DETROIT, 550 Maccabees Bldg • CLEVELAND, 3297 Chadbourne Road • BRIDGEPORT, 211 State St.
PRODUCT DEVELOPMENT • MOLD DESIGN • MOLD CONSTRUCTION • PLUNGER MOLDING • TRANSFER MOLDING • INJECTION MOLDING • COMPRESSION MOLDING

PLASTICS DIGEST*

Abstracts from the world's literature of interest to those who make or use plastics or plastics products. Send requests for periodicals to the publishers listed

General

SPECTRAL-TRANSMISSIVE PROPERTIES AND USE OF EYE-PROTECTIVE GLASSES. R. Stair. National Bureau Standards Circular 471, 34 pp. (Oct. 8, 1948). Spectral-transmission data on most of the widely distributed brands and types of glasses employed in protecting the eyes from harmful ultra-violet, visible or infra-red radiant energy are presented. The standardization of shade numbers for protective glasses used in industry, glasses for special welding operations, the use of colored glasses for night driving, the elimination of glare in sunlight, and plastic eye protectors are discussed.

REPORT ON PLASTICS FOR 1948. J. Delmonte. Electrical Manufacturing *43*, 96-101, 176, 178, 180, 182 (Jan. 1949). Developments in the plastics territory in 1948 are reviewed.

NEW ADVANCES IN PRINTED CIRCUITS. C. Brunetti, ed. National Bureau Standards Misc. Publication 192, 73 pp. (Nov. 22, 1948). Seventeen papers on printed circuits given at a symposium on this subject in October 1947 are presented. A section on general discussion is also given.

Materials

ALLYL ESTER OF PHOSPHONIC ACID. A. D. F. Toy and L. V. Brown. Ind. Eng. Chem. *40*, 2276-9 (Dec. 1948). The polymerization of diallyl benzenephosphonate yields a new transparent, flame-resistant resin with a high refractive index. Diallyl benzenephosphonate forms flame-resistant copolymers with vinyl acetate, methyl methacrylate, diallyl esters of organic acids, and unsaturated polyesters. By using mixtures of methyl methacrylate and diallyl benzenephosphonate to give a resin of the same refractive index as glass fabric, a laminate was obtained which was fairly clear and transparent. The properties of the polymer and some copolymers are presented.

RESEARCH PROGRESS IN DIELECTRIC MATERIALS. Electrical Manufacturing *42*, 112-18, 168, 170, 172, 174, 176, 178, 180 (Dec. 1948). Full abstracts of the papers on dielectric materials and test methods presented at the 1948 Conference on Electrical Insulation are presented.

POLYVINYL CARBAZOLE RESIN AS A DIELECTRIC MATERIAL. W. F. Busse, J. M. Lambert, C. McKinley, and H. R. Davidson. Ind. Eng. Chem. *40*, 2271-5 (Dec. 1948). Polyvinyl carbazole resin is a thermoplastic material having excellent dielectric properties comparable with those of polystyrene and a heat distortion point of up to 150° C., compared with about 80° C. for polystyrene. The monomer, which melts at 70° C., can be used for impregnation of electric components, such as paper condensers, and then can be heat polymerized. The polymer is rather brittle but can be compression or injection molded. On stretching at high temperatures, the polymer develops a highly fibrous, asbestos-like structure. This fibrous material can be used as a reinforcing filler in compositions which after molding can be machined. Special high molecular weight polymers can be produced in the form of thin films with excellent thermal and dielectric properties. The properties of this polymer are presented in detail.

Plasticizers

RESIN-PLASTICIZER SYSTEMS. G. J. Dienes and F. D. Dexter. Ind. Eng. Chem. *40*, 2319-25 (Dec. 1948). A quantitative method of comparing resin-plasticizer systems in two important temperature regions is described. The characteristics in the temperature region of application are evaluated from log stiffness-temperature curves, and those in the processing temperature region by parallel-plate plastometer measurements. A simple and practical empirical equation is developed which describes mathematically the inverted S-shape log stiffness-temperature curves. The equation is characterized by four physical constants: the limiting stiffness at low and high temperatures, the temperature, T_m, at which the slope of the log-stiffness-temperature curve has its maximum value, and the magnitude, S_m, of this maximum slope. This equation is shown to be applicable to a large variety of materials. The variation of T_m with percent of plasticizer, which is approximately linear in the 15 to 50% concentration range, is shown to be a good measure of plasticizing efficiency. The magnitude of the slope, S_m, which is approximately independent of the plasticizer concentration in the 15 to 50% region, measures the temperature sensitivity of the resin-plasticizer system. The most useful quantity for comparing resin-plasticizer systems in the vicinity of processing temperature is the absolute viscosity obtainable by parallel-plate plastometer techniques. It is shown that the log viscosity-percent plasticizer curve is linear in the 15 to 50% range. The slope of this curve is a measure of the high temperature plasticizer efficiency.

Properties

PERMEABILITY OF LAMINATIONS. P. W. Morgan. Modern Packaging *22*, 159-160 (Sept. 1948). A novel effect on moisture permeability results when a film of polyvinyl alcohol or other hydrophilic polymer is laminated with a layer of moderately moisture-permeable polymer. A greatly differing permeability in opposed directions through the laminate is obtained when the vapor-pressure difference across the films is relatively high. Whenever the polyvinyl alcohol film is placed on the low humidity side of a barrier, it shows an apparent permeability considerably lower than when the film is adjacent to the moisture source. Polyvinyl alcohol on the high humidity side is no barrier to moisture vapor and diffusion is limited only by the less permeable layer.

PRODUCE-FILM COMPARISONS. J. Kaufman, B. A. Friedman, and H. W. Hruschka. Modern Packaging *21*, 147-51 (Aug. 1948). The properties of transparent film used

*Reg. U. S. Pat. Office.

Specify these

quality Du Pont products for
HIGH PURITY • UNIFORMITY

FORMALDEHYDE
U.S.P. STRENGTH AND PURITY
Water White—Full Strength—Low in Acid and Metal Content

PARAFORMALDEHYDE
Powdered or granular, minimum strength 95%

HEXAMETHYLENETETRAMINE
Technical (powdered and granular) and U.S.P. (Crystals)

SHIPMENTS in standard containers are made from the factory or from stocks maintained in principal cities.

FOR INFORMATION and technical assistance, call our nearest district office. Electrochemicals Department, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland, Cincinnati, Dallas,* Detroit, El Monte (Calif.), Houston,* Kansas City,* New York, New Orleans,* Oklahoma City,* Philadelphia, Pittsburgh, San Francisco, Tulsa,* Wichita.*
Barada & Page, Inc.

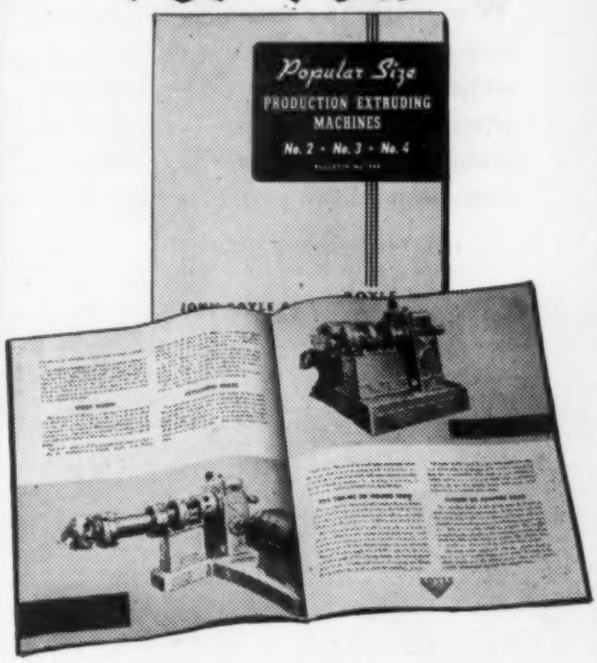
Tune in to Du Pont "Cavalcade of America" Monday nights NBC Coast to Coast

Prompt delivery—tank cars and standard packages

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

ROYLE HAS PREPARED For You—



TO meet the many requests for information concerning Royle "Popular Size" Extruding Machines, a fully illustrated, quick reference bulletin has been prepared describing the Royle # 2, # 3, and # 4 extruding machines — the extruders most commonly associated with current extrusion processes.

Please use the handy coupon below to order your copy of this useful bulletin. It will be sent to you promptly and without obligation.

JOHN ROYLE & SONS ROYLE
10 ESSEX ST., PATERSON 3, N. J.
PATERSON N. J.
PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN 1887

Please send me Royle bulletin titled "Popular Size."

*Company*_____

*Name*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

You can Depend on
MICHIGAN
for
MOLDED PLASTICS
M

With more than a quarter-century experience in the development and production of all types of plastic parts, Michigan Molded offers years of experience—dependability—high competence—complete engineering staff—most modern production facilities.

Your inquiries will receive prompt consideration

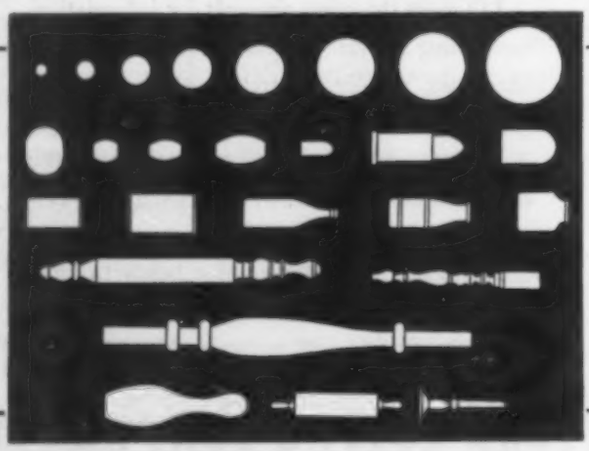
MICHIGAN MOLDED PLASTICS, INC.
DEXTER, MICHIGAN

Sales Offices

Buffalo, Chicago, Cleveland, Detroit, Minneapolis, Moline, New York, Norfolk, Philadelphia, St. Louis, Springfield, Mass., Waukesha, Wisc.

COMPRESSION • INJECTION • FABRICATION

form grinding
TO CLOSE TOLERANCE



Balls, beads, and various shapes ground to specification. Lengths from ⅛" to 7". Plastic, fiber, hard rubber, wood, other materials.

ORANGE MACHINE PRODUCTS
INC.
82 Main Street West Orange, New Jersey
Orange 5-4645

to package vegetables were determined. These included changes in weight of packaged vegetables, composition of gas in package and changes in appearance.

PHASE EQUILIBRIUM DIAGRAMS FOR HIGH POLYMERS. R. S. Colborne. British Plastics *20*, 346-53, 356 (Aug. 1948). The principles of phase equilibria diagrams are applied to solubility and gel formation in high polymers. These diagrams offer a convenient method for presenting a large amount of data in a simple form and show clearly the relationship revealed by the data. They have practical as well as theoretical value; 25 references.

TRANSMISSION PROPERTIES OF MATERIALS IN THE MILLIMETER WAVE REGION. E. Wantuch, J. H. Rohrbaugh, J. P. Cooley, J. H. Greig, and J. Shmoys. J. Applied Phys. *19*, 1092-3 (Nov. 1948). The transmission properties of polystyrene and polytetrafluoroethylene in the wave length range from 0.3 to 2.2 cm. are reported.

Applications

NEW IDEAS FOR CHEESE. Modern Packaging *22*, 110-12 (Nov. 1948). Polystyrene, polyethylene and cellulose acetate plastics are used to package cheese for the retail market.

POLYESTER RESINS FOR SOLVENTLESS INSULATING VARNISHES. C. F. Hill and N. C. Foster. Electrical Manufacturing *42*, 83-5, 164 (Dec. 1948). The properties of a solvent-reacted polyester-type resin that seems to approach the "ideal" requirements for an insulating varnish are described. Tests show that it provides complete fill of voids in an insulating structure, plus superior thermal stability, moisture protection, and good electrical characteristics. Special processing techniques are necessary to apply it.

A SQUEEZE BOTTLE FOR ACID. Modern Packaging *21*, 106-7 (Aug. 1948). A squeeze bottle for acids is made of polyethylene with a valve molded of polystyrene.

Testing

SOME "TEMPERATURE-YOUNG'S MODULUS" RELATIONSHIPS FOR PLASTICS. H. W. Moll and W. J. LeFevre. Ind. Eng. Chem. *40*, 2172-9 (Nov. 1948). The variation of Young's modulus with temperature for any given plastic material is useful in evaluating the suitability of that material for certain applications. A laboratory apparatus is described, which makes possible the accurate and efficient determination of the relationship between temperature and Young's modulus for a wide variety of plastic materials and sample sizes. Temperature-modulus data for a number of plastics are compared with impact and service data.

PREPARATION OF UNIFORM FILMS AND THEIR DEPENDENCE ON THE IRREGULARITIES OF THE BASE SURFACE. S. Johanson. A.S.T.M. Bulletin No. 155, 53 (Dec. 1948). For the preparation of uniform paint and plastic films it is obvious that first-rate panels as well as a good applicator are necessary. With a mechanically operated applicator, for instance of Bird Film type, and a first-rate plate glass, films with a maximum thickness variation of 5 to 10μ can be produced.

PENETRATION TEST. H. Manley. Modern Packaging *21*, 152-3 (Aug. 1948). A simple optical test for determining the penetration of films by liquids is described.

traditionally Tenite

TOUGH, transparent Tenite, favorite material for shatterproof Gits oiler reservoirs, is going strong in this important field after fifteen years. Reasons for the success of Tenite oilers are readily apparent: Oil reserve can be seen at a glance through the clear plastic, and the incidence of oiler breakage is drastically minimized because of the high impact strength of Tenite. Equally important, Tenite is not damaged by lubricating oils.

The use of Tenite for these parts affords decided advantages from a manufacturing standpoint, also. During the molding process, metal parts and inserts can be combined directly with the Tenite reservoir, thereby obviating separate assembly operations. Tenite molding is rapid, and superior results are reproducible, thanks to the uniform high quality of the plastic.

For complete information about the properties and many other uses of Tenite, write TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Company), KINGSPORT, TENNESSEE.

Gits oilers with Tenite reservoirs manufactured by Gits Bros. Mfg. Co., Chicago

Information regarding Tenite is obtainable through representatives located in Chicago, Cleveland, Dayton, Detroit, Leominster (Mass.), Los Angeles, New York, Portland (Ore.), Rochester (N. Y.), St. Louis, San Francisco, and Seattle; and elsewhere throughout the world from Eastman Kodak Company affiliates and distributors.

TENITE

an Eastman Plastic

U.S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 25¢ each.

POLYMERS. T. W. Evans and E. C. Shokal (to Shell Development Co.). U. S. 2,450,234, Sept. 28. Production of an allyl polyether of a polyglycerol by contacting allyl glycidyl ether with stannic chloride in the presence of an organic solvent diluent.

PLASTICIZER. G. L. Doelling and K. H. Adams (to Mississippi Valley Research Laboratories, Inc.). U. S. 2,450,272, Sept. 28. As plasticizer for organic plastic materials, an alkoxyalkyl ether of a halonitrophenol.

THERMOPLASTIC COIL. O. C. Wilson and P. S. Britton. U. S. 2,450,324, Sept. 28. Apparatus for forming a continuous rod-like strip of thermoplastic material into a spiral coil.

STARCH-RESIN PRODUCT. C. C. Kesler, W. C. Black, W. L. Hicks, and C. N. Owen (to Penick and Ford, Ltd., Inc.). U. S. 2,450,377, Sept. 28. Cooking starch and low-soluble dextrin with urea formaldehyde condensate at pH 4.0 to furnish a water-resistant film.

MOLDABLE PRODUCT. F. E. Frey (to Phillips Petroleum Co.). U. S. 2,450,424, Oct. 5. Molded product comprising the reaction product of sulfur dioxide and 2-butene.

VINYL POLYMERS. A. J. McGillicuddy (to B. H. Levenson or F. L. Towne). U. S. 2,450,435, Oct. 5. A resinous composition of vinyl chloride plasticized with dioctyl phthalate and liquid petrolatum.

CELLULAR THERMOPLASTICS. O. R. McIntire (to Dow Chemical Co.). U. S. 2,450,436, Oct. 5. Method and apparatus for production of cellular thermoplastic materials.

POLYETHYLENE. L. Schmerling (to Universal Oil Products Co.). U. S. 2,450,451, Oct. 5. Ethylene is mixed with a peroxide catalyst under pressure in hydrocarbon solvent solution in the presence of a metal.

COATING. F. E. Drummond (to Chemical Developments Corp.). U. S. 2,450,503, Oct. 5. Articles are coated by spraying with mists of stannic chloride and styrene.

SOLID POLYMERS. P. J. Gaylor. U. S. 2,450,547, Oct. 5. Solid polymers obtained at low temperatures in the presence of Friedel-Crafts catalysts are screened immediately after reaction so as to prevent coalescence.

ESTER POLYMERS. E. C. Hurdis (to U. S. Rubber Co.). U. S. 2,450,552, Oct. 5. The polymerization of unsaturated esters is controlled by adding as promoter a polyamino compound.

ORGANO-SILOXANES. J. F. Hyde (to Corning Glass Works). U. S. 2,450,594, Oct. 5. A copolymeric organosiloxane.

ALKYD POLYMERS. B. W. Nordlander (to General Electric Co.). U. S. 2,450,682, Oct. 5. An interpolymer of a diallyl ester of a chlorinated phthalic acid and an unsaturated alkyd resin.

VULCANIZING AGENT. W. E. Vaughan and B. Barnett (to Shell Development Co.). U. S. 2,450,771, Oct. 5. Vulcanizing an unsaturated high polymer with a stable plastic sulfur composition.

DECORATION. C. M. Marberg (to Interchemical Corp.). U. S. 2,450,902, Oct. 12. Decorative composition for glass fabrics comprising pigment, a solution of heat-convertible resin, and a vinyl chloride-acetate copolymer resin.

CUTTING MACHINE. J. J. Gano and L. W. Richardson (to Controls Laboratories, Inc.). U. S. 2,451,027, Oct. 12. Machine for making transverse cuts in a moving column of extruded plastic material.

POLYMER RECOVERY. A. C. Skooglund and C. C. Swoope (to Standard Oil Development Co.). U. S. 2,451,047, Oct. 12. Process for preparing a purified low-temperature olefinic substance.

MOLDED BUTTON HOLE. E. Emsig. U. S. 2,451,077, Oct. 12. A molded integral sewing hole button of thermoplastic resinous material.

REINFORCED STRUCTURES. E. L. Vidal and L. J. Marhoefer (to Vidal Corp.). U. S. 2,451,131, Oct. 12. Method of molding a hollow structural member inside of a flexible bag by means of external fluid pressure.

MELAMINE RESIN. W. Charlton and J. B. Harrison (to Imperial Chemical Industries, Ltd.). U. S. 2,451,153, Oct. 12. Heating with a monohydric alcohol and a soluble phenol-formaldehyde condensed with alkali.

TALL OIL POLYMERS. R. Richter and J. J. Misket (to Nopco Chemical Co.). U. S. 2,451,173, Oct. 12. A rubber-like polymer prepared by polymerizing a hydroxy-acetylated tall-oil by condensing with heat in the presence of an esterification catalyst.

VINYL RESIN. L. F. Reuter (to B. F. Goodrich Co.). U. S. 2,451,174, Oct. 12. Method of vulcanizing a plasticized polymer of halogenated ethylene comprising adding 2,2,4-trimethyl hydroquinoline and heating.

ACRYLIC POLYMERS. S. T. Semegen (to B. F. Goodrich Co.). U. S. 2,451,177,-8, Oct. 12. A saturated aliphatic monohydric alcohol ester of acrylic acid is cured by heating with an oxide of lead or alkali metal hydroxide.

COMPOSITE ARTICLE. G. H. Taft (to B. F. Goodrich Co.). U. S. 2,451,182, Oct. 12. Composite sheets formed by adding to a sheet of vulcanized rubber butyl phthalyl butyl glycollate, chlorinating the surface, applying a solution in methyl ethyl ketone of polyvinyl chloride plasticized with butyl phthalyl butyl glycollate, and drying.

(Please turn to page 108)

ELASTRON*

means quality in consumer items

ELASTRON is the flexible polyvinyl plastic, compounded and extruded exclusively by Industrial Synthetics Corporation. ELASTRON will not crack, chip, peel, or rot, and resists rough usage. It is non-inflammable and is cleaned with a swish of a damp cloth. Colorfast brilliant hues combined with a variety of surface finishes such as high-gloss patent, box calf, pin seal and grosgrain impart the "superior quality" look to products made of ELASTRON.

saves finishing operations

ELASTRON extrusions are produced with smooth or beaded edges eliminating sewing or other edge-finishing operations. That's why ELASTRON is ideal for watch straps, suspenders, belts, baby harnesses, handbags, furniture webbing and upholstery piping, and straps and handles for luggage, radios and cameras.

available in many shapes

Tubes, rods, tapes up to 12" widths, and a wide variety of shapes are available, suitable for use as appliance bumpers, refrigerator gaskets, shower spray tubing and numerous industrial applications.

VOLTRON* another product of Industrial Synthetics Corporation is specifically compounded and extruded into rods, tubes and shapes required by the electrical industry.

*Reg. U.S. Patent Office

INDUSTRIAL SYNTHETICS CORPORATION 225 NORTH AVENUE, GARWOOD, N. J.

PLASTIC MARKING SPECIALISTS

Trade marking and decorating of thermoplastic and thermosetting products can be done perfectly and inexpensively by our engineered HOT STAMPING METHOD. This below - the - surface process simulates engraving and, in appearance and wear resistance, surpasses decals, silk screening and wiping-in. It can be done in all colors, regardless of the shape or size of the item. Even intricate designs come out clean.

In our modern plant, the largest of its type in the country, we can do any quantity of marking which is required. You are invited to submit sample pieces to have them marked *free* . . . or write for full details.

FREE PICK-UP AND DELIVERY SERVICE FOR THE METROPOLITAN AREA.

ROLL LEAF ART STAMPING CO.

"PLASTIC MARKING SPECIALISTS"

3610 PALISADE AVE. UNION CITY, N. J.

ACCURATELY CONTROLLED, CLEAN, EFFICIENT ELECTRIC

with WATLOW STRIP HEATERS

FOR MELTING SOLIDS HEATING AIR and LIQUIDS PRE-HEATING DRYING

Accurately formed to insure close fit for rapid efficient heat conduction, Watlow Units are resistant to burn-outs. Flat shapes are formed units in special sizes for temperatures up to 1000° F.

1½" width—6" to 72"—115 or 230V—150 to 3300W
2" width—4" to 43"—115V or 230V—100 to 1400W
2½" width—4" to 43"—115V or 230V—150 to 1575W
3" width—4" to 43"—115V or 230V—150 to 1900W

Send for Catalog of Heating Units and Ratings.

Immersion, cartridge, band heating units and hot plates.

SPECIALISTS IN ELECTRIC HEATING UNITS

WATLOW ELECTRIC MANUFACTURING COMPANY
1328 N. 23d St. St. Louis 6, Mo.

GLUE COMPOSITION. G. Widmer and W. Hertner (to Ciba Ltd.). U. S. 2,451,186, Oct. 12. A glue containing urea-formaldehyde resin, melamine-formaldehyde resin, and vetch-seed meal.

COATING. L. J. Gold (to Milprint, Inc.). U. S. 2,451,212, Oct. 12. A thermoplastic coating of Norelac, a plasticizer such as a toluene ethyl sulfonamide and a paraffin.

ION EXCHANGE. W. A. Blann (to American Cyanamid Co.). U. S. 2,451,272, Oct. 12. Anion exchange resin is regenerated by contacting with aqueous acid followed by contacting with an alkaline substance.

POLYMERS. W. L. Alderson, Jr. (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,451,370, Oct. 12. Process for preparing long chain secondary alkyl N-substituted polymeric styrene-maleamic acids and their dispersions.

LAMINATING. E. M. Queeny (to Monsanto Chemical Co.). U. S. 2,451,410, Oct. 12. A laminating syrup comprising silica acrogel, and a thermosetting resin.

SYNTHETIC YARNS. W. W. Watkins (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,451,420, Oct. 12. Acrylonitrile polymer yarn is prepared by extruding a solution through a shaped orifice into a bath of aqueous calcium chloride.

PLASTIC COMPOSITIONS. W. E. Elwell and R. L. Meier (to California Research Corp.). U. S. 2,451,435, Oct. 12. A copolymer of an unsaturated ketone and an unsaturated nitrile.

MOLDED HELMETS. H. Goldsmith (to Sports Products, Inc.). U. S. 2,451,483, Oct. 19. Molded helmets of plastic sheet material.

COPOLYMER. M. E. Cupery and H. S. Rothrock (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,451,536, Oct. 19. Interpolymer of diallyl diglycolate and styrene.

CALENDERED THERMOPLASTIC. W. R. Wheeler (to Bakelite Corp.). U. S. 2,451,597, Oct. 19. Stresses in thermoplastic films are removed by applying pressure on smooth heated surfaces until adhered and heating without pressure until strains are relieved.

SUBSTITUTED POLYAMIDES. H. W. Gray (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,451,672, Oct. 19. N-Alkenoxymethyl polyamides are rendered alcohol-insoluble by incorporating with an alcohol-soluble N-alkenoxymethyl polycarbonamide and a free radical-producing agent and heating.

POLYAMIDES. R. S. Schreiber (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,451,695, Oct. 19. Method for producing polyamides of high birefringence.

POLYETHYLENE. K. B. Jarrett (to Imperial Chemical Industries Ltd.). U. S. 2,451,743, Oct. 19. Polyethylene is embrittled by mixing with methylated spirits, mechanically disintegrating in an enclosed space, and drying the product.

HOT MELT COATING. A. E. Young and K. D. Bacon (to Dow Chemical Co.). U. S. 2,451,792, Oct. 19. Hot melt coating comprising ethyl cellulose and a ternary mixture of mineral oil, a polyhydric alcohol ester of polymerized resin, and maleic-anhydride modified ester gum.

LOW HEAT LOSS

MAINTENANCE of FLEXIBILITY over WIDE TEMPERATURE RANGES

Write us for bulletin and further information

HARFLEX*

PLASTICIZERS

LOW TEMPERATURE FLEXIBILITY

LOW VISCOSITY

HIGH TEMPERATURE PERFORMANCE

HIGH EFFICIENCY

DICAPRYL SEBACATE
DICAPRYL ADIPATE
DIBUTOXYETHYL SEBACATE
DICAPRYL PHTHALATE
DIBUTYL SEBACATE
DIBENZYL SEBACATE
DIHEXYL SEBACATE
BUTYL BENZYL SEBACATE
CAPRYL BENZYL SEBACATE

*Trade Mark Canadian Distributor: W.C. Hardesty Co. of Canada Ltd., 1 Wellington St. W. — Toronto, Ont.

HARDESTY CHEMICAL COMPANY, INC.

HARCHEM

41 EAST 42nd ST. NEW YORK 17

MANUFACTURERS OF SEBACIC ACID

The Candid Camera Tells Why

Martindell

always delivers

THE BEST in PLASTIC MOLDING

In line with the most progressive concerns in the industry, MARTINDELL maintains its own die-making department. Here skilled die-makers follow your drawings or patterns with such care that your piece comes out of the mold by the hundred or the thousand, each one an absolute duplicate of the one before, and of the quality that you expect.

INJECTION MOLDING
COMPRESSION MOLDING
TRANSFER MOLDING

MARTINDELL MOLDING COMPANY

North Olden at Sixth
TRENTON 2, NEW JERSEY

JAMES M. KENDALL, 1182 Broadway
New York, N. Y. — Tel. Lexington 2-2892

Plastics

PHENOLIC • UREA • CELLULOSE ACETATE MATERIALS AND POLYSTYRENE MATERIALS

T. A. TYLER, Box 4337
Philadelphia, Pa. — Tel. Ogontz 6373

BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery

"Moulds for Plastics" by W. M. Halliday.

Published by The English Universities Press, Ltd., Saint Paul's House, Warwick Square, E.C.4, London, for Temple Press Ltd., Bowling Green Lane, London E.C.1 Price 30/—. 259 pages.

A compilation of articles which have appeared in serial form in the British technical magazine *Plastics*, makes up the 11 chapters of this book. Some revision and re-arrangement has been carried out and new material has been added to make this an important and comprehensive handbook for plastic mold engineers and to all those connected with manufacturing plastics products.

Since molds for injection molding are very similar to those used in die casting, many of the principles outlined apply equally as well to that art.

Subjects covered include mold maintenance methods and procedures; the different metals available for plastics molds; compression type molds, with one entire chapter devoted to the constructional features of semi-positive type of compression molds; injection type molds, including various methods for designing the mold for threaded parts; design and construction of safety features for injection molds; and the toolroom and its operation. A number of detailed drawings supplement the text.

"Physical Aspects of Colour," by Dr. P. J. Bouma.

Published by Elsevier Publishing Co., Inc., 215 Fourth Ave., New York 3, N. Y. Price $5.50. 312 pages.

An introduction to the scientific study of color stimuli and color sensations is presented in this 312-page book. The author, starting from the established laws of color mixing, gives a complete description of the origin and perception of colors in a systematic manner. In the main, the subject is approached from the side of experimental physics and illuminating engineering. The stress falls on the expression of colors by numbers, and on the calculation and measurement of colors. The purpose of the book is to survey the theory of colorimetry and its applications to practical problems, to enable the reader to carry out the calculations occurring in practice, to facilitate the reader's study of professional literature, and to hand the reader the necessary tools for a deeper study of other aspects of the color problem.

Resorcinol (Bulletin C-8-124)—The properties and uses of resorcinol—the chemical used in the preparation of room temperature setting resin adhesives, as a medicinal, and as an intermediate for the production of rubber, textile, and leather processing chemicals, dyestuffs, and for the synthesis of pharmaceutical chemicals—are discussed in this 15-page technical bulletin. *Chemical Div., Koppers Co., Inc., Koppers Bldg., Pittsburgh 19, Pa.*

Memorandum of increased rates and charges of the Union Pacific Railroad Company—This 62-page booklet consists of seven sections. Section 1 is an alphabetical list of points showing increase group basis. Section 2 is a chart showing ex partes 162-A and 166-B increases between various increase groups. Section 3 is an alphabetical list of commodities accorded specific or maximum increases in the two tariffs. Section 4 is a consolidated increase table on commodities other than grain and except commodities on which maximum increases are provided. Section 5 is a consolidated increase table on grain and grain products. Section 6 consists of increase tables for application to rates on commodities accorded specific or maximum increases. Section 7 is a map of the U. S. showing boundry lines of the various increase territories. *Freight Traffic Dept., Union Pacific Railroad, 15th & Dodge Sts., Omaha, Neb.*

New advances in printed circuits—The proceedings of the symposium held last year by the Aeronautical Board's Aircraft Radio and Electronics Committee on the status, applications, and limitations of printed circuits are covered in this booklet of 22 papers on the subject. Also included is a summary of the subject and a discussion of the important technical questions raised in the symposium. The 73-page booklet is available for 40¢ by writing to the *Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

Dry and paste mixes—Latest developments in mixers for dry and paste mixing are described in this 22-page booklet. The company's line of machines is illustrated and described. Included in the group are double arm paste mixers, ribbon mixers, double cone blenders, and various types of cylinder mixers operating in horizontal and vertical positions. *Paul O. Abbe, Inc., 145 Center Ave., Little Falls, N. J.*

H-P-M smooth line laboratory press (Bulletin 4801)—Operation of the company's new 20-ton capacity, self-contained laboratory press is described, with diagrams showing the use of various fixtures and attachments. *The Hydraulic Press Mfg. Co., Mount Gilead, Ohio.*

Speed packing manual—The sixth edition of this shippers handbook has just been published. In 199 step-by-step photographs and drawings, detailed instructions are given for packing a wide variety of products ranging from clothing and jewelry to automobile parts and prefabricated houses. It is claimed that the packaging ideas outlined in this book can save shippers up to 60% in packing costs. *Sherman Paper Products Corp., Newton Upper Falls 64, Mass.*

Plexiglas for signs—New signs that are being used on a large scale are described and illustrated in this 13-page booklet. Some of the illustrated signs are accompanied by cross-section diagrams. *Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa.*

Time- and money-saving case histories that show how Bostitch fastens it better and faster with wire—Brief stories of consumer experiences with this company's fastener are included in this 13-page booklet. Illustrations present such applications as applying insulation, sealing protective wrapping, and assembling seat cushions. *Bostitch, 302 Mechanic St., Westerly, R. I.*

For the way to better sanding and finishing

Apply the 2-Factor Formula

In sanding and finishing plastics, two factors affect your quality and your cost: (1) the *abrasive products themselves* and (2) *their correct utilization*. Properly integrated, these factors give you a formula for top-quality work at bed-rock cost.

When selecting abrasive products, you must consider equipment, material, finish, production rate. You should also consider the *quality* of the abrasives. The Carborundum Company's line of abrasives is a *premium*-quality line. It offers abrasive belts in both cloth and paper backings with a wide range of abrasive grains. Continuing research is our assurance to you that this high quality will be sustained... that these products will be *uniform* as to grain structure, bonds, backings, and "mileage."

To help you apply the second factor—*correct utilization*—The Carborundum Company maintains a staff of abrasive engineers with broad experience in many industries who can tap the resources of The Carborundum Company when necessary. These trained men can help you select and apply abrasive products. They can show you how to balance cutting speed against smoothness of surface or abrasive "mileage" as a means of getting more and better production at lower cost. As your first step in applying the "2-Factor Formula," write to The Carborundum Company, Niagara Falls, N. Y.

COATED ABRASIVES BY

CARBORUNDUM

TRADE MARK

BELTS SHEETS ROLLS DISCS

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

EXTRUDERS
BY
MPM
OFFER

mpm

Control

MPM offers six-zone control of electrically heated cylinders with nine-eleven or fifteen separate cooling zones for removal of frictional heat or for fast cooling. Higher temperatures—higher screw speeds —higher production—per machine.

Flexibility

These *Modern* machines are furnished electrically heated but can be heated or cooled by steam, oil, water etc. Interchangeable heads and dies to produce covered wire, tubing, rods, strips, wide sheeting are also available along with conveyors, granulators, dryers, etc.

Leadership !

Modern engineering and specialization has resulted in the installation of these machines with 18 of a possible 20 leading material suppliers during the past two years. More complete cooperation with foreign customers too has made MPM the largest exporters of extruding equipment during the same period.

modern plastic machinery corp. mpm

SEND FOR ILLUSTRATED BROCHURE

15 UNION ST., LODI N. J.
CABLE ADDRESS MODPLAS

new!
attractive!
low priced!

AMPACET®

PEARL EFFECT POLYSTYRENE
MOLDING POWDER

Available in delicate pastel tones and mother of pearl effects

This highly satisfactory molding compound has all the desirable properties and characteristics of standard Polystyrene. Its beautiful shades are perfect for such items as jewel boxes, cabinets, buttons, toiletries and a wide variety of utility and decorative products.

PHOSPHORESCENT POLYSTYRENE
- *Glows in the dark*
- *Lasting color*
- *Blue or Yellow glow*
- *Lower priced*

METALLIC POLYSTYRENE
- *Silver and Gold*

Special Colors **POLYSTYRENE**
To your specification in pellets of uniform size at lower prices.

Also Manufacturers of AMPACET
CELLULOSE ACETATE MOLDING POWDER

AMERICAN
MOLDING POWDER and CHEMICAL CORP.

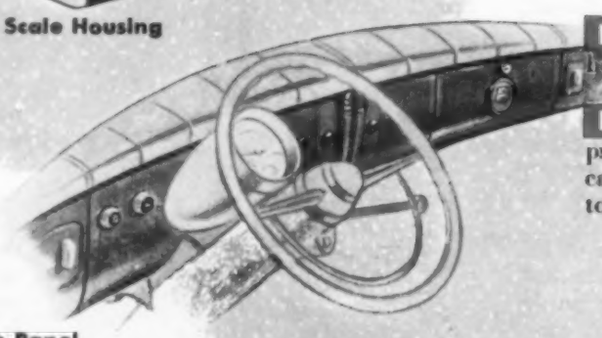
Main Office: 44 Hewes Street • Brooklyn 11, N. Y.
Plant: 67 North 9th Street • Brooklyn 11, N. Y.
Phone: ULster 5-3887 • *Cable:* Chemprod Brooklyn

GENERAL AMERICAN MOLDS PLASTICS FOR AMERICA'S LEADING INDUSTRIES

Designed by Egmont Arens

Motorola Radio-Phonograph Cabinet

Toledo Scale Housing



Nash Dash Panel

Perhaps plastics can improve your product or some part of your product. Plastics can often add new beauty and sales appeal ... cut costs ... speed production ... perform many functions more efficiently. Consult General American about your plastics problems.

CUSTOMERS Leaders in these industries: Automotive, furniture, washing machine, refrigerator, radio, television, industrial specialties, electrical appliances.

PRODUCTION General American produces parts and products as small as screw cap pilot lights and as large as complete television cabinets. General American's engineers are constantly developing practical, new applications for plastics.

SPECIAL SERVICES Facilities for assembling of parts and products, painting and special handling wherever necessary.

DIES Dies may be supplied by customers or built in General American's complete die shops.

EQUIPMENT Large batteries of high speed presses, including injection presses of 2 to 48 oz. capacity and compression presses from 100 to 2000 tons (with 71" x 74" platen areas).

At General American you benefit from more than 40 years of precision production experience.

Plastics Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

New York, 10 East 49th Street • 135 So. LaSalle Street, Chicago 90, Illinois • *Los Angeles, Richfield Building*

NEW MACHINERY AND EQUIPMENT

Preform press for fine powders—Model 30, a preform press developed to meet the need for equipment to preform materials in the range of A.S.T.M. 200-300 mesh, is announced by Defiance Machine Works, Inc., Detroit, Ohio. Rated at 75 tons, the press has speeds up to 60 strokes per minute. The special powder feeder is operated by an internal cam with pneumatic cylinder follower. An electronically controlled clutch and brake combination allows the press to be used for fine powders or granular compounds.

Die transfer table—Lyon-Raymond Corp., 7363 Madison St., Greene, N. Y., announces a die transfer table with an overhanging section which permits easy transfer of dies weighing up to 300 lb. from presses with extended bases. The overhanging section, which is 14 in. wide by 24 in. long, bridges the gap caused by the press base extension. It can be removed completely or tilted up when not in use. The table can be hydraulically raised from 28 in. in the lowered position to 44 in. in the elevated position. The main top is 30 by 30 inches.

Electric furnace—A floor model electric furnace, No. 11 FM Special, with accurate temperature control from room temperature to and including 2000° F., is being marketed by K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37, Ill. Designed for tool and die work, hardening, and drawing, it has two sets of heating elements—the top and bottom comprising one set and the two sides comprising the other. All controllers are an integral part of the furnace. Inside dimensions of the furnace are 8 in. wide, 6 in. high, and 12 in. deep. Overall dimensions are 24 in. wide, 29 in. deep, and 68 in. high. Standard operation is on 220 volt, single phase, but 110 volt models are available. A 220 volt, three phase type may be obtained at additional cost. Current consumption is 4 kw.

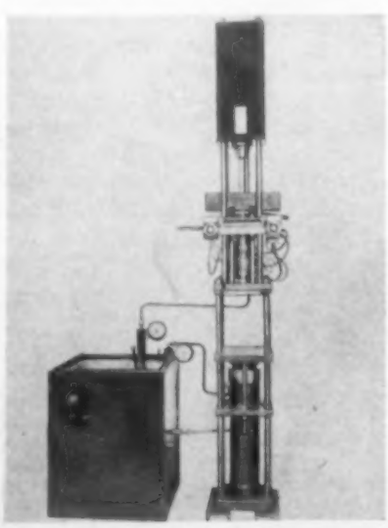
Continuous curtain bonding unit—Mayflower Electronic Devices Inc., 6014 Hudson Blvd., West New York, N. J., announces a continuous high frequency curtain bonding unit. This machine takes two rolls of 36 in. vinyl, welds the center seam together, cuts, trims, and hems both sides. The 72-in wide material is then cut to length, the bottom hemmed, and the top run through a dual wheel rotary machine to produce a 0.012-gage header. From there the curtain is taken to a grommet machine which punches material from vinyl strips and welds it to the header stock.

Marking fixture—A new fixture which can be installed on a foot or arbor press to permit marking of round, flat, and other shaped parts is being produced by The Acromark Co., 365 Morrell St., Elizabeth 4, N. J. This operation uses a "V" block as a nest or stamping block assembly. The stamping die, engraved on a flat surface, will stamp full upon the cylindrical surface unless the cylinder or rod radius is less than double the size of the characters to be marked. To use this fixture, a deep mark must be permissible.

Timer—Watson-Stillman Co., Roselle, N. J., has introduced a timer which adds the advantage of a stuffer circuit to injection machines already in use. It may be installed on the company's 12E and 16E Completeline injection molding machines, and is mounted directly above the present control cabinet. It houses all instruments for the following controls: Timer 1—up to 60 sec.—cycle delay; Timer 2—up to 60 sec.—injection forward; Timer 3, up to 60 sec.—injection hold; Timer 4—up to 5 min.—cure; Timer 5—up to 60 sec.—die slow-open; and Timer 6—up to 60 sec.—stuffer control. A selector switch on the cabinet permits operation of machine with or without stuffer control.

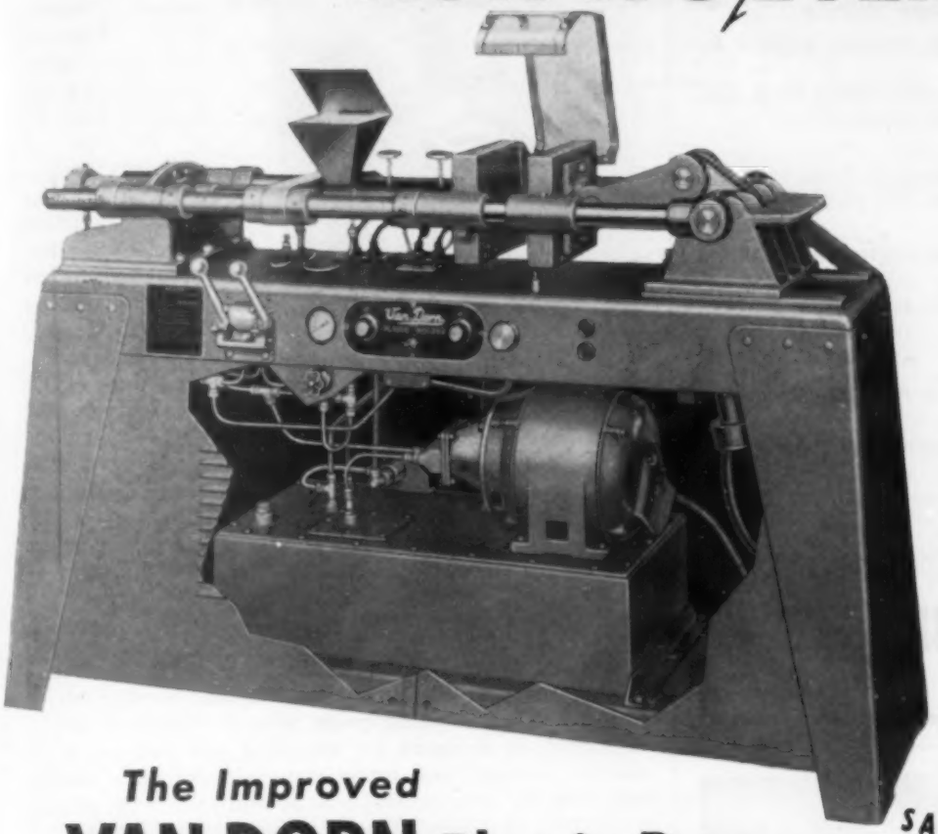
Hydraulic cutter—The National Cutter Div., Frank M. Hill Machine Co., Walpole, Mass., has announced a new 57-in. hydraulic cutter. The clamp, the knife, and even the back-gage of this machine are operated by hydraulic power. By a simple adjustment the pressure of the clamp may be regulated to suit the work while a large dial registers the working pressure at any setting. This versatile cutter provides for the use of special knives for pinking, tabbing, and cutting special shapes. Because the base of the clamp is 5 in. wide, fragile materials can be rigidly held in position without undue crushing or damage to the material being cut.

Injection molding press—An injection molding press which develops 30-ton mold clamping pressure adjustable with a maximum of 14,000 lb. injection pressure has been introduced by Munton Mfg. Co., 9400 Belmont Ave., Franklin Park, Ill. While designed for all types of plastics, it is especially recommended for use with nylon. It features a lever for cutting off nylon sprues, thereby eliminating seepage. screens, etc. The heating tube plasticizes about 20 lb. of material per hour. This tube is chrome plated on the inside. Band heaters and cartridge heaters can be checked and changed outside. Because of dual heat controls, the upper part of the heating tube can be set 75 to 100°



Always Outstanding

NOW IT'S EVEN BETTER!



Spreader added to heating cylinder cuts heating cycles up to 50%.

Hard Chrome Plating of interior of cylinder cuts resistance to flow of materials, protects against corrosive compounds.

New Relief Valve—set at 1500 P.S.I.—insures maximum clamping pressure always, permits separate adjustment of injection pressure.

New Needle Valve increases gage life, by allowing gage to be shut off except for periodic checks on pressure.

SAME LOW PRICE!!

The Improved VAN DORN Plastic Press

With the addition of these four new features, this Van Dorn Press is *unequalled* in the 1 oz.-capacity class for molding practically all thermoplastics including nylon. This remarkably economical press—

Costs under $2000

Operates 8 hours for under a dollar

Uses less expensive molds

Can be set up by one man in 20 minutes

This Van Dorn Injection Press is unexcelled for profitable production of small parts, and "pilot" or experimental runs on bigger jobs.

We make mold bases for Van Dorn Presses.

THE Van Dorn IRON WORKS CO.
2687 EAST 79th STREET • CLEVELAND 4, OHIO

FREE BULLETIN tells all the facts. *Write for it.*

FLEXIBLE MOLDS

COST LESS — MADE QUICKLY

Announcing: New and unique synthetic rubbers for

- molds used in casting polyester and cellulose resin demonstration models and advertising displays.
- liners for low-pressure laminating of airplane, boat, and furniture parts; mannequins; and wall partitions.
- reusable patterns used in making electroformed dies.
- easy manufacture of toys, gaskets, and display pieces.

Also: New, hard, non-porous metallic cements for

- low-cost, heat resistant acrylic forming dies.
- high-lustre duplicator machine master patterns.

Write for free Information Bulletin No. 1.

MULTI-MOLD PRODUCTS

265 West 30th Street — New York 1, N. Y.

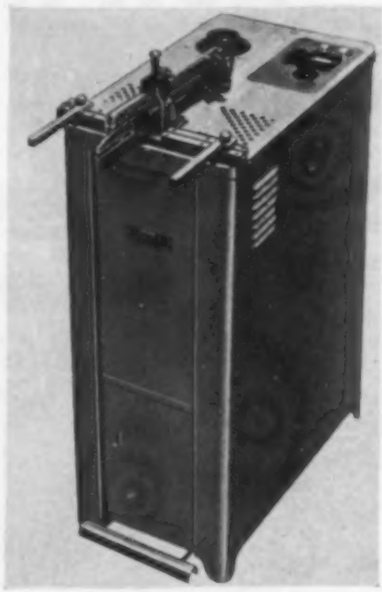
"Gar-Form" Plastic Boats Reach Top Production by Contour-Saw Shortcuts

In making the famed "Gar-Form" one-piece plastic boats, top production speed depends on DoALL High-Speed Saws. These cut wood and plastic parts on assembly lines; also slot gears, trim engine castings and rudders. There's a DoALL Saw and blades to cut any type of material. Write for literature describing economies possible in your plant.

The DoALL Co.
World-Famous Contour Saws
Des Plaines, Illinois

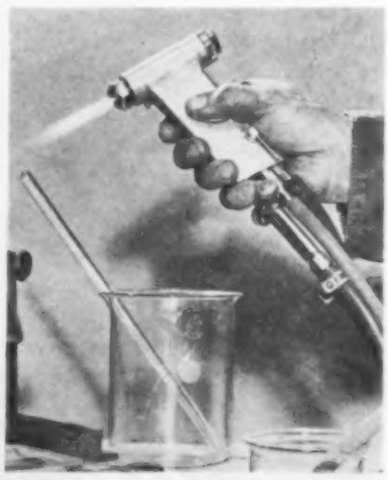
cooler than the bottom part. The plunger tip raises out of the heating tube so that it can be air cooled between shots.

Corner stayer—The Spectrum Mfg. Co., 540 N. 63rd St., Philadelphia 31, Pa., announces a complete redesign of its electronic corner stayer. New features include electronic timing adjustable from 0.1 to 1½ sec., a mercury relay, and heating power sufficient for a 5-in. seam. According to the company, tuning is practically eliminated and production speeds up to 1600 welds per hr. have been obtained. Besides being used for sealing corners of cellulose acetate boxes, the stayer may be used for the production of acetate tubes.



Embossing press—Craftsmen Machinery Co., 575 Atlantic Ave., Boston 10, Mass., has resumed production of its Cramaco embossing press after a war-time lapse. This press is designed for stamping and embossing on plastics, leather, and other materials. It has a sliding bed, 10¼ by 10¼ in., and a head equipped with sliding plate, 10¼ by 7½ in., which can be removed face up for mounting dies. A 12-ton pressure can be developed by means of a hand lever and toggle action. The press weighs about 600 lb. and measures 31 in. high, 29½ in. wide, and 18 in. deep.

Flame spray pistol—A small flame spray pistol which weighs 1¼ lb. and sprays grams or ounces of powder instead of pounds has been developed by the Schori Process Div., Ferro-Co Corp., 8-11 43rd Rd., Long Island City 1, N. Y., for use in laboratories and research sections of industrial plants. It will spray any metal or plastic powder, or mixtures of metals and plastics. As the powder is sprayed, it passes through the temperature controlled flame and is heated to the temperature required to lay down a continuous film. Non-porous films of plastics can easily be sprayed. The pistol can also be employed for heating, soldering, and brazing.



For Plastics Laminates that are:

- **Light in weight and extremely tough.**
- **Resistant to corrosion and weathering.**
- **Permanently colored: Eliminate original cost of surface finishing—no maintenance cost.**
- **Easy to fabricate: Can be formed with either high or low-pressure laminating equipment.**
- **Economical: Priced lower than most commonly used laminating reinforcing materials.**

. . . use these Fiberglas* Materials for reinforcement

FIBERGLAS CHOPPED-STRAND MAT (TYPE M-503)—Strands of Fiberglas filaments are chopped into 1″ to 3″ lengths, arranged at random in mat form, lightly bonded with suitable resins for specific end uses, as follows:

PHENOL FORMALDEHYDE BINDER—for use with phenolic resins in high-pressure laminating.

POLYESTER BINDER—for use with polyester resins in laminating flat sheets. Also suitable for matched-die compression-molding of complex shapes.

POWDERED POLYSTYRENE BINDER—for use with polyester resins in low-pressure laminating. Mat has soft texture. Easily draped over intricate molds. Recommended for fabricating parts by bag-molding technique.

POLYSTYRENE EMULSION BINDER—for use with polyester resins in low-pressure laminating of lamp shades, display or ornamental panels.

UREA FORMALDEHYDE BINDER—for use with melamine resins in high-pressure laminating.

FIBERGLAS SWIRLED-STRAND MAT (TYPE M-504)—Continuous strands of Fiberglas filament are laid in overlapping circular pattern, rigidly bonded in mat form with a urea-polystyrene combination. For use with polyester resins. May be used in matched-metal or vacuum-bag molding for production of decorative panels.

FIBERGLAS CHOPPED STRANDS NO. 38—Strands of Fiberglas filaments are chopped into 1″ to 3″ lengths for use in making preforms by the blown-fiber process. Where large production justifies the preform process, parts can be made at low cost, competitive with many metal parts using low-pressure polyester or high-pressure melamine and phenolic resins. (Description of this blown preform process is given in Manual A9.3.1—"Fiberglas-Reinforced Plastics".)

FIBERGLAS CUT FILAMENT NO. 38—Available in the form of loose, silky hanks of Fiberglas filament strands 19″ to 20″ in length. Used as local reinforcement where the laminate requires greater stiffness or impact strength. Provided with two types of binders: (1) OIL BINDER for use with polyesters, melamines and phenolics; (2) CHROME ORGANIC BINDER for use when increased "wetting" of fibers is desired, and for maximum physical properties under wet conditions.

FIBERGLAS SURFACING MAT—Fine Fiberglas fibers are closely oriented, matted and bonded into thin sheets for use where smooth surface on laminate is desired. Available with two binders: (1) STARCH BINDER, that maintains the white color of the mat and permits use of pigmented resins, if desired; (2) FURFURAL BINDER, that gives the mat a brownish color which in itself is decorative.

FIBERGLAS MILLED FIBERS—Strands of Fiberglas filaments are screened and hammermilled to form small nodules or fluffy masses of extremely short fibers. For use in matched-die compression molding or for laminate surfacing. Available with two binders: (1) STARCH AND OIL BINDER, for use with phenolics and melamines for increased heat stability and reduced moisture absorption; (2) CATIONIC BINDER, compatible with polyesters, increases temperature resistance and increases dimensional stability.

FIBERGLAS YARNS—Strands of extremely fine continuous filaments of glass are twisted into yarns having high tensile strength. Packaged on aluminum tubes with multiple ends to facilitate use with polyester resins and provide unidirectional strength in fishing rods, piping and solid rods. Two types of Fiberglas Yarns are available: (1) ECD 450-1/0 (1.0 TPI), 12 ends, treated with silicone complex, designed primarily for use with alkyd polyester resins; (2) ECG 150-1/0 (1.0 TPI), 8 ends, treated with a chrome complex for general use with polyester resins.

CLOTHS WOVEN OF FIBERGLAS YARN—The characteristic high tensile strength of Fiberglas Yarns is imparted to cloths woven of these yarns. Of all Fiberglas reinforcements, such cloths produce the most favorable strength-to-weight ratio in plastics laminates. Cloths of Fiberglas may be used either with low-pressure polyester resins in the production of flat sheets and lightweight aircraft parts—or with high-pressure melamine resins in laminating panel board for electrical applications.

Cloths woven of Fiberglas Yarns are available in several weaves and treatments to produce the desired characteristics in finished laminates. Various weights and constructions of cloths may be had in square (plain) or crow-foot and long-shaft satin weaves to provide bi- or unidirectional strengths.

TREATMENT 112 consists of heat-cleaning the cloth to provide utmost translucence with polyester resins—and, when used with silicones, to obtain maximum electrical and physical properties.

TREATMENT 114 consists of heat-cleaning the cloth and adding a water-repellent, chrome-organic complex binder to assist in the wetting and bonding by polyester resins and to contribute maximum dry and wet physical strengths to the finished laminates.

TREATMENT 111 consists of removing the oil component from the oil-starch lubricant on the Fiberglas Yarn. This converts the starch to caramelized form, providing an excellent bonding base for melamines and phenolics.

For more complete information on the properties, applications, economics and typical methods of fabricating products of plastics reinforced with Fiberglas Mats, Fibers and cloths woven of Fiberglas Yarns, write, on your company letterhead, for a copy of "Fiberglas-Reinforced Plastics" Manual A9.3.1 . . . Owens-Corning Fiberglas Corporation, Dept. 876 Toledo 1, Ohio.

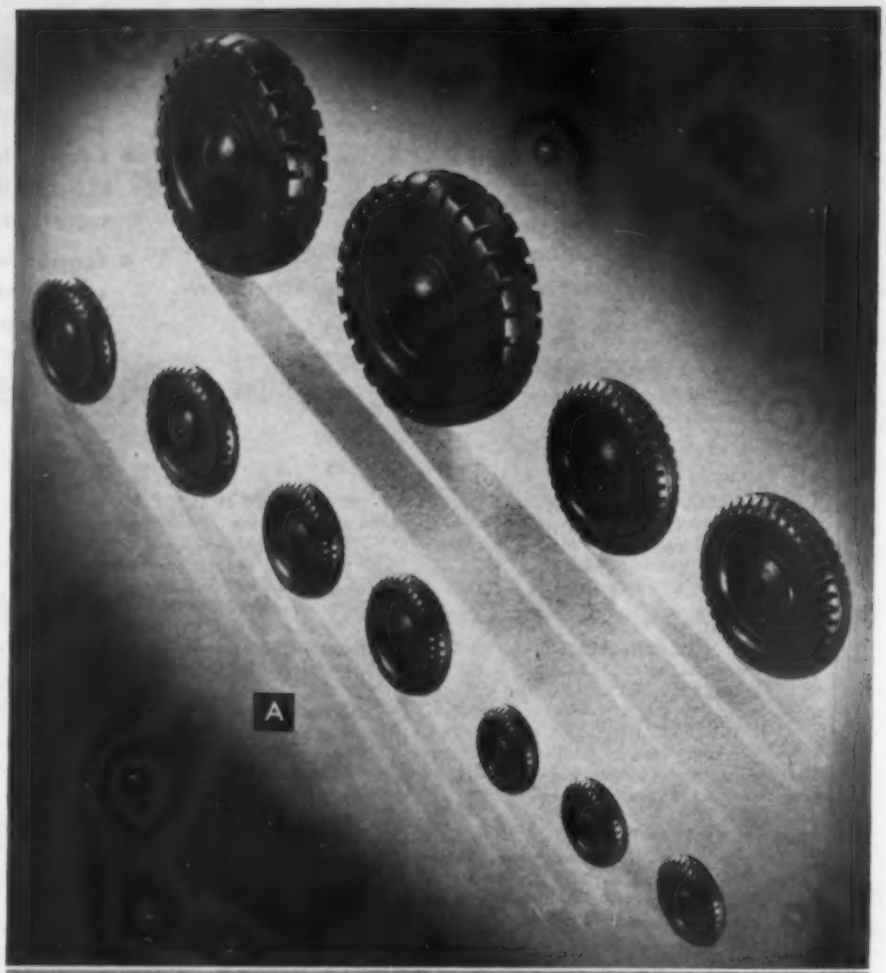
*Fiberglas is the trade-mark (Reg. U.S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with glass fibers.

OWENS-CORNING FIBERGLAS PLASTICS REINFORCEMENTS

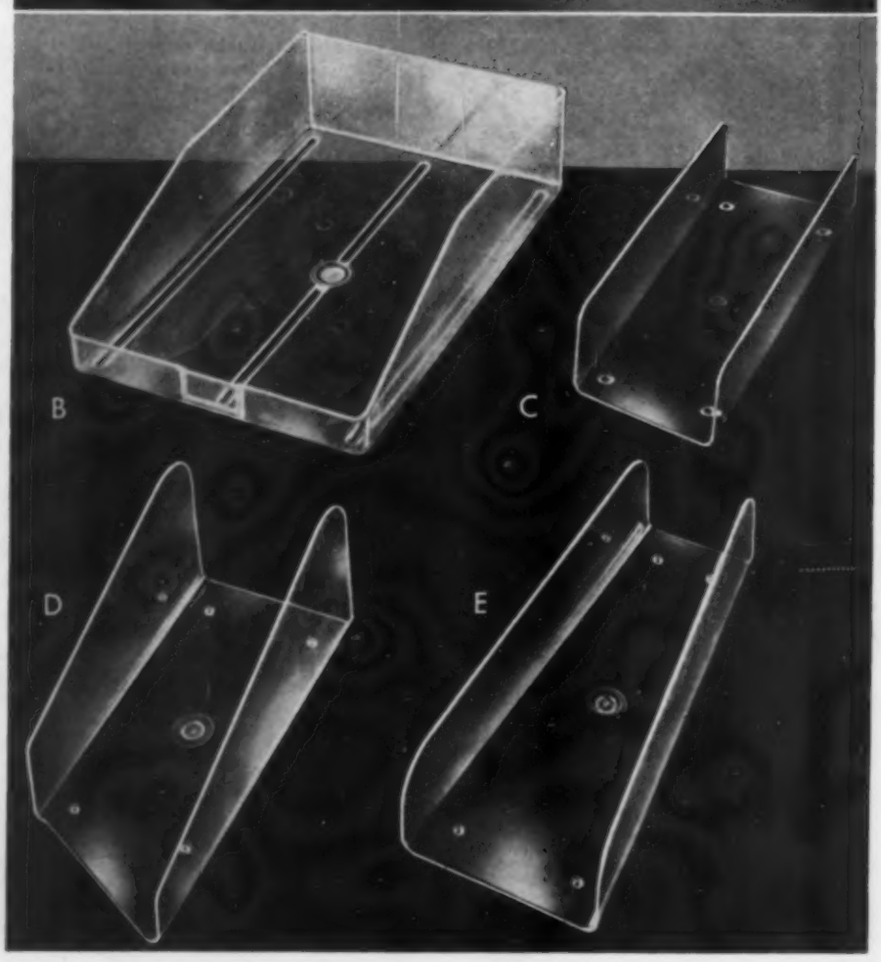
PLASTICS STOCK MOLDS*

MARCH 1949

Molders are invited to submit samples of stock products to be described on this page as space permits. Address samples and detailed information to Stock Molds Editor, Modern Plastics, 122 E. 42nd St., New York 17, N. Y.



A—Wheels for toys. Injection molded from special thermoplastic-asphalt mix of maker. In black, red, green, and special colors. Wheels are available in complete series of standard sizes from 23/32 to 4½ inches. Mold cavities vary with size of wheel, from 80 cavities for smallest to 4 cavities for largest. Smallest wheel weighs 2¾ lb. per thousand; largest wheel 500 lb. per thousand. Standard axle sizes from ⅛ in. for smallest to ¼ in. for largest; on orders of 200,000 and up special axle sizes may be had. The Cleveland Container Co., Swartz and Factory Sts., Plymouth, Wis.



B—Utility tray for use in haberdashery departments for men's shirts; in women's wear stores for slips, blouses, etc.; for home use in dressing tables, pantries, and refrigerators. Molded from clear polystyrene in size 15 by 10 by 4 inches. Weight 20 ounces.

C—Anklet and glove tray. Molded from clear polystyrene; 10 by 4½ by 5 in.; weight 5 ounces.

D—Haberdashery tray. Molded from clear polystyrene in size 13 by 4½ by 2½ inches. Weight 7 ounces.

E—Tie tray. Molded from clear polystyrene; 12 by 4¾ by 3 inches. Weight 6 ounces. B, C, D, and E all produced in one cavity molds by Plastics and Metals Co., 292 Madison Ave., New York 17, N. Y.

*Reg. U.S. Patent Office.

TO

Manufacturers who'd like

LOWER MOLDING COSTS

An open letter

We'd be crazy if we guaranteed to underbid any other molder, although our customers say we often do.

Better than that, we at Norton can guarantee you some things which usually add up to definite and substantial savings.

For one, technical cooperation. The Norton engineering staff is highly respected for sound ideas on plastics design, color, materials... matters that seriously effect the service your product will give and often its salability too.

Also, heavy experience. Twenty-five years of precision molding for customers whose name everybody knows. Large and small pieces... long and short runs... on compression and injection presses.

Let us show you, on your own jobs, how Norton service adds up to lower costs. Just send us a model, sketch or blue print.

NORTON Laboratories, Inc.

COMPRESSION AND INJECTION MOLDING

LOCKPORT, NEW YORK

Sales Office: NEW YORK CITY – 347 Fifth Ave. CHICAGO – 9 South Clinton St.

New ALBUM-LENGTH RECORD

FOR THE *BEST* IN MOLDED PLASTICS

PLAYER BY PHILCO

with Molded Plastic Cabinet by GENERAL INDUSTRIES

Among the newest developments in the radio-phonograph industry is the PHILCO Album-Length Record Player. Designed for the Columbia long-playing microgroove records of Vinylite plastic, it affords 45 minutes of continuous entertainment from a single record.

The attractive, streamlined cabinet which houses this unit is typical of the custom molded plastic parts produced by The General Industries Company, a leading supplier of PHILCO cabinets. Single-piece base and hinged cover are molded of Bakelite in General Industries' battery of 650-ton compression presses.

Whether your plastic products are simple control knobs, large intricate cabinet assemblies, or somewhere in between, you'll find it worthwhile to investigate the cost-cutting, quality-building advantages of having them custom molded by General Industries. Backed by 25 years of practical molding experience, General Industries' competent engineering staff is ready to serve you. Write us *today.*

THE GENERAL INDUSTRIES CO.
MOLDED PLASTICS PIONEERS
DEPARTMENT R • ELYRIA, OHIO

Representatives in Buffalo, Chicago, Philadelphia and Detroit

THE PLASTIC MONOFILAMENT SPOOLER

Eliminates breakage Speeds production

A Plastex Continuous Spooler provides the fastest, most foolproof means of handling monofilaments as they come from your extruder. Its unique design avoids intermediate winding and re-winding on special reels. Since tension is easily regulated by a special clutch mechanism and take-up speeds are automatically variable, winding is level and breakage and distortion of the monofilaments are largely eliminated.

Once installed the Plastex Continuous Spooler can easily be adjusted for winding any monofilament.

For full details about this machine and the Plastex "Orion" Unit for correct orientation of any monofilaments and the Plastex "Coil-on" Unit for flat strip extrusions, write today.

Export Agents
Omni Products Corp.
460 4th Ave., N.Y. 16, N.Y.

PLASTEX MACHINE CORPORATION
PATERSON 27, NEW JERSEY

Consult Waterbury for Molded Plastics

- Creative Service in Product Development
- Research, Design, Engineering Counsel
- Compression, Transfer, High Speed and Injection Molding
- Over a Century of Fine Tool Work
- Finishing, Assembling, Packaging

Our technical staff will gladly confer with you
Write for Waterbury Plastics Catalog

WATERBURY COMPANIES, INC.
South Main St. Waterbury, Conn.

The Vinyl Film Market

The real growth of the vinyl industry should come through new uses which take advantage of the properties of the material. Market estimates, all too often based on production capacity, should consider the capacity to consume

by RALPH F. HANSEN*

ALTHOUGH the vinyl film industry is strongly bidding to carve a niche for itself in the United States economy, at present its growth is based on replacements of rubber, leather, and fabrics. At best this is not a good foundation for the true growth because sooner or later the latter industries will endeavor to regain this business. The real growth of the vinyl industry should be based on:

1) Expanding uses rather than replacements.

2) Broadening the base consumer use of products, due to the inherent beauty and low price of vinyl film and sheeting, heretofore uneconomical when made from other materials.

3) New uses based on the unusual properties of vinyl.

4) Industrial uses.

5) Packaging of metal specialties and other products in reusable containers.

Monsanto's Plastics Sales Research Dept. conservatively has estimated 1947 sales of "unsupported" vinyl film and sheeting at 54 million pounds. The 1948 sales are estimated at 79 million pounds. Too often markets are estimated and analyzed on a basis of capacity to produce, such as the number of injection molding machines (although this indicates a trend), without checking with consumption or the capacity to consume. In the present case, retail sales in a given classification, income per family, and the number of unit family dwellings, were used with the Facts for Industry figures of the U. S. Department of Commerce. After computing these figures, the final estimate was based on more realistic consumer end uses, as in Tables I and II, by gathering data from Federal Reserve Board statistics of Department Store Trade; from various consumer product associations; from mail order houses and their allotted advertising space versus the space given to the same product made from other materials; and from other consumer statistical sources and checks.

The resulting units in each consumer end use made from all materials were then broken down into an estimate percentagewise of vinyl film's participation in these various markets. Since some of

(*Please turn to page* 125)

*Assistant sales manager, Vinyl Film Dept., Plastics Div., Monsanto Chemical Co., Springfield, Mass.

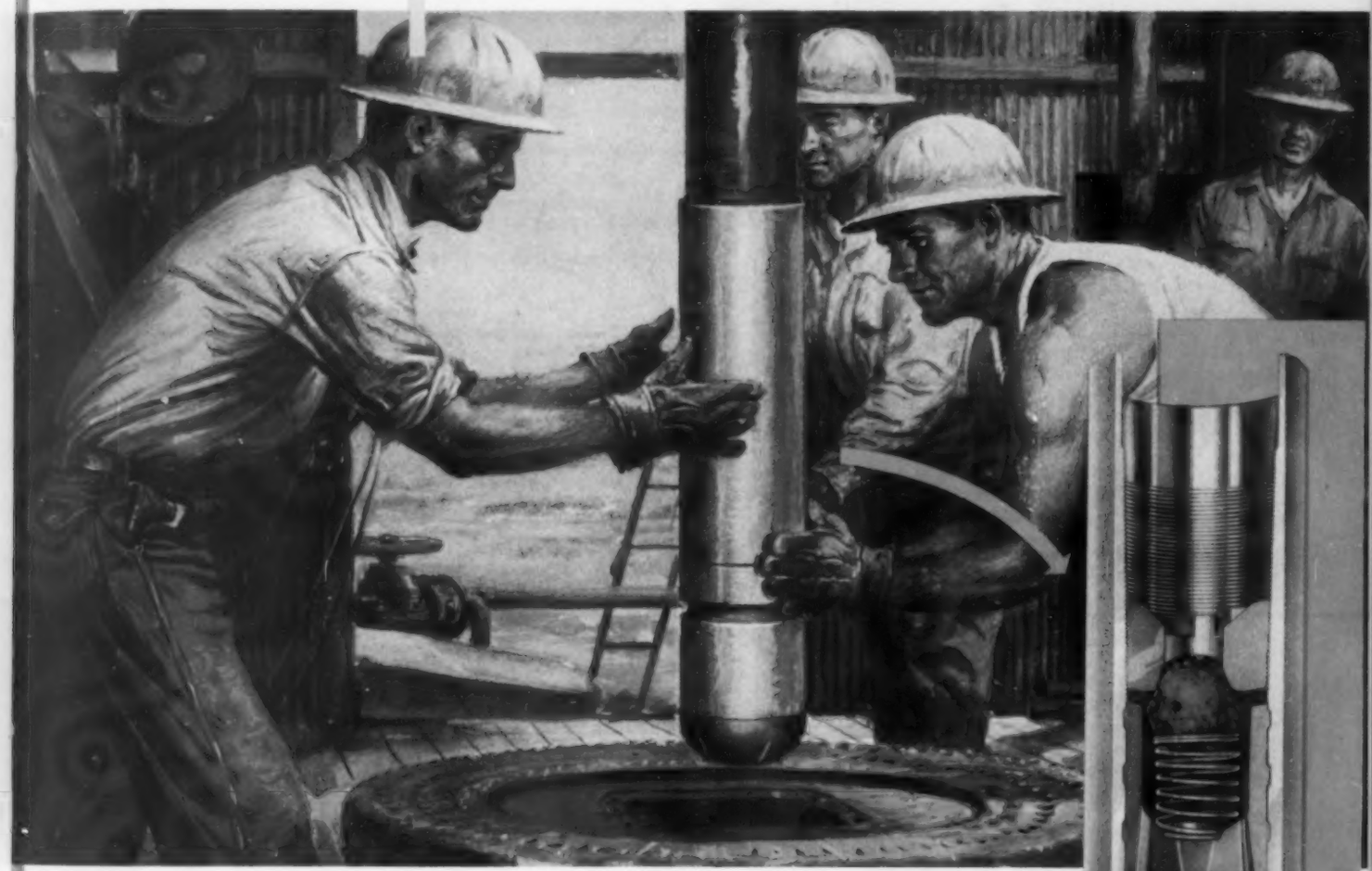
Plastics where plastics belong

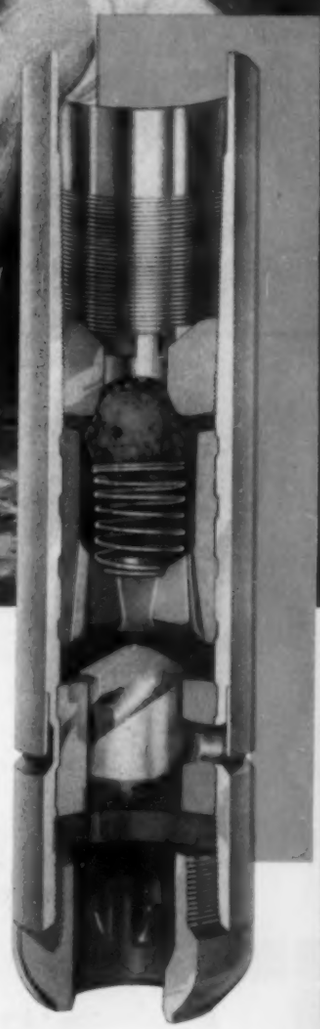
for strength, wear resistance, and ease of machining . . .

Structural strength, wear resistance, and ease of machining are three of Synthane's many properties which, in combination with its other mechanical, chemical and electrical characteristics make it one of industry's valuable materials.

A good electrical insulator, Synthane, the set plastic, is stable over a wide range of temperatures. Hard, dense and durable, it also possesses desirable moisture and corrosion-resistant qualities.

The ability of Synthane to stand up under adverse conditions is interestingly demonstrated by its use in the Turbo-Jet Float Shoe.





Various parts of Float Shoes, used in cementing oil wells, are fabricated from Synthane, for example, the valve ball and thrust plate in the shoe illustrated at the right.

Synthane resists the abrasive action of the liquid cement pumped through the shoe. It is thermosetting, so that it retains its original size and shape, yet is easily drilled out after the cement has set. Thus, Synthane's combination of strength, wear resistance, stability and ease of machining make it a perfect material for this difficult job.

If this brief review of Synthane's unique combination of desirable properties suggests its use in your product, let us help you with design, materials or fabricated parts. Write today for the new Synthane Plastics Catalog, 8 River Road, Oaks, Pennsylvania.

SYNTHANE

where Synthane belongs

SHEETS • RODS • TUBES • FABRICATED PARTS • MOLDED-LAMINATED • MOLDED-MACERATED

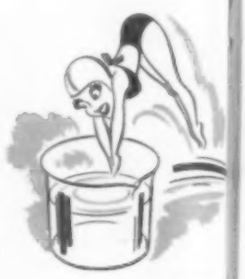
PORTRAIT OF A HUNTER

If you are always hunting for a better material, one which combines many valuable physical, chemical and electrical characteristics—consider Synthane laminated plastics.

Synthane has a place in almost every industry because its unusual *combination* of desirable properties can often make a good product or process better.

On a weight-for-strength basis Synthane compares favorably with many metals. It is durable, lightweight, high in tensile, compressive and flexural strengths.

Synthane resists corrosive atmospheres, moisture, oils and solvents. Synthane is also the set plastic, stable over a wide range of temperatures.



Synthane is an excellent insulator —with high dielectric strength, low power factor and low dielectric constant. The ease with which it may be machined adds to its value for practical applications.

Hard and dense, Synthane resists fatigue under repeated impact. Withstands abrasion, does not splinter.

If these properties of Synthane suggest its possible use in your product, let us work with you on materials or fabricated parts. Send Coupon for your copy of the Synthane Plastics Catalog . . . no obligation of course.

..FOR MORE ANSWERS ON PLASTICS..

SYNTHANE CORPORATION, 8 RIVER ROAD, OAKS, PA.

Gentlemen:

Please send me without obligation a complete catalog of Synthane technical plastics.

Name _____

Company _____

Address _____

City _____ *Zone* _____ *State* _____

SYNTHANE

S

DESIGN • MATERIALS • FABRICATION • SHEETS RODS • TUBES • FABRICATED PARTS • MOLDED-MACERATED • MOLDED-LAMINATED

these figures were available for the 1939 census only, they were adjusted to the 1948 volume by deflating the statistics by the cost of living indices to secure the change in units. To ascertain the pounds of vinyl film used in each consumer end use, the same pattern was followed as above, taking the average yardage and gage per consumer unit and then computing the weight of vinyl film per unit.

Light and heavy gages

A division was made of the vinyl film market in what is known as light gage and heavy gage film. The 1947 estimate for light gage film, shown in Table I, is 23 million lb. (light gage being film from 4 to 11 mil). The estimated use of heavier gages

Table I—Vinyl Film Consumer End Use Market Survey Light Gage: All Film 0.004 in. Unless Otherwise Noted.

Consumer end uses	*Estimated units, all materials*	*1947*	*1948*
		lb.	*lb.*
Household uses			
Shower curtains	3,500,000	2,400,000	
Bathroom curtains }		1,500,000	
Kitchen curtains }	89,000,000	653,000	
All other curtains }		450,000	
Draperies	5,500,000	175,000	
Table covers (cotton only)	20,000,000	1,200,000	
High chairs and play items	NA	600,000	
Crib covers and sheets	NA	175,000	
Garment bags	NA	940,000	
Bowl and appliance covers	NA	122,000	
Yard goods	.....	6,300,000	
Miscellaneous	.....	1,000,000	
Total household uses		15,515,000	26,000,000
Wearing apparel			
Raincoats, 0.006-0.004″	16,000,000	1,500,000	
Baby pants, bibs	15,000,000	480,000	
Aprons			
Household	11,000,000	350,000	
Industrial, 0.008″	.....	600,000	
Wristguards, miscl.	NA	600,000	
Total Wearing apparel		3,530,000	7,000,000
Air inflatable items			
Toys (balls, rings), 0.004-0.012″	NA	1,850,000	
Ruffling and shelf edging	NA	.....	
Air mattresses, seat cushions, etc. 0.008″	NA	500,000	
Sick room supplies, 0.006″	NA	200,000	
Total air inflatable items		2,550,000	4,000,000
Industrial uses	.....	1,000,000	2,000,000
Miscellaneous	.....	380,000	1,000,000
TOTAL light gage		23,000,000	40,000,000

Yours, at Gotham Plastics —

complete fabricating and assembling service plus ENGINEERING AND RE-ENGINEERING

Gotham assumes your entire fabricating and assembling assignment, enabling you to devote your entire effort to distribution. After procuring the necessary components and supplies, Gotham molds, fabricates, assembles, finishes, decorates—Gotham will even pack and ship your merchandise. When necessary, Gotham is ready to re-engineer.

WHAT IS RE-ENGINEERING?

Re-engineering is Gotham's name for the process of redesigning a plastic product that has failed to succeed by a small margin, failed to pass the test of consumer acceptance because it contains a bug."

HOW DOES GOTHAM RE-ENGINEER?

When an article has proven unsatisfactory, very often the mere respecification of a material with the proper characteristics will suffice to transform it into a success. At other times, Gotham will have to retool the mold for a part which has failed, or alter the way a piece is assembled. Gotham's skill and experience, its many past triumphs, assure you of a re-engineering job done well.

CONTRACT FABRICATING, TOO

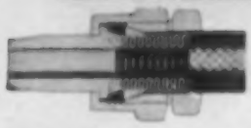
If your product calls for deep drawing or forming, if it needs die-cutting, sawing, engraving, cementing, designing—you'll find Gotham gives you fast, low-cost, expert service.

LET GOTHAM DO YOUR MANUFACTURING

Send for details today. Gotham will tell you how they can make your product at the lowest cost, and submit suggestions on re-engineering, where necessary. Better still, why not include a sample or drawing which will facilitate analysis and quoting. Write to Gotham—*now!*

GOTHAM PLASTICS CORP.
110 Sherman Avenue, New York 34, N. Y.
LO. 7-7993-4

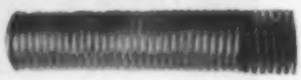
YOU GET EXTRA PROFIT AND PRODUCTION with Flexible Hose and Coupling specially designed for platen presses



Packless Detachable Coupling, strong, compact, reusable, requires no heat to apply. A leak-proof, metal to metal connection.

Packless Flex-Control Unit, self-draining at all times. An efficient, horizontal self-supporting flexible hose unit specially designed for platen presses.

Packless Seamless Flexible Bronze Hose, made from highest grade, straight-drawn, annealed tubing and fabricated to give long, dependable service. Wide variety for all applications in plastic industry.



Packless Units are so well regarded that they are invariably specified by leading equipment manufacturers and operating men throughout the industry.

971 PACKLESS

METAL PRODUCTS CORP.

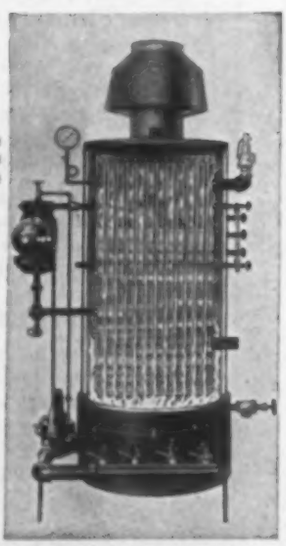
NEW ROCHELLE NEW YORK

THE *Economical* SOLUTION TO YOUR STEAM PROBLEMS . . .

THE KANE BOILER PACKAGE

Each KANE BOILER PACKAGE is carefully considered by us as an "individual" job—from the customer's requirements to the finished unit. And each BOILER PACKAGE is a compact, self-contained steam source that includes: the correctly sized KANE Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

Engineered Steam at its best, with four decades of experience at your disposal—so, send your steam problem to us for study and recommendation.



The KANE Boiler is built to A.S.M.E. specifications, in sizes to 30 H. P.

ENGINEERED STEAM AT ITS BEST

MEARS-KANE-OFELDT INC.

1903-1915 EAST HAGERT STREET, PHILADELPHIA 25, PA.

FOUR DECADES OF AUTOMATIC GAS-FIRED BOILER MANUFACTURING EXPERIENCE.

Table II.—Vinyl Film Consumer End Use Market Survey Heavy Gage.

Consumer end uses	*Estimated units, all materials*	*1947*	*1948*
		lb.	*lb.*
Accessories			
Handbags	68,000,000	15,000,000	
Belts	175,000,000	300,000	
Trim, etc.	.....	200,000	
Total accessories		15,500,000	17,000,000
Upholstery and tapestry (yd.)			
Cotton	184,000,000		
Rayon	73,400,000	12,500,000	16,000,000
Leather-upholstery only	9,000,000		
Coated fabric	NA		
Luggage			
Leather bags	3,400,000	0	
Other than leather	12,700,000	200,000	750,000
Brief cases	2,500,000		
Shoes			
Slippers			
Children's			
Women's	458,000,000	300,000	750,000
Men's			
Automotive			
Leather, sq. yd.	8,000,000		
Upholstery, fabric, sq. yd.	39,000,000		
Rubberized fabric, sq. yd.	6,000,000		
Seat covers	4,000,000	0	
Door panels—trim, etc.	NA	1,150,000	2,500,000
Bookbinding	NA	250,000	300,000
Wall covering			
Wall paper (rolls)	485,000,000	100,000	200,000
Miscellaneous	.....	1,000,000	1,500,000
TOTAL heavy gage		31,000,000	39,000,000
TOTAL light and heavy gage		54,000,000	79,000,000

(from 12 to 24 mil) is 31 million lb., as shown in Table II, which fall into the main classification of handbags and upholstery. The estimated 1948 market in various industries will be available by the time this article is published. Copies of this estimate may be obtained from the Advertising Dept., Monsanto Chemical Co., Plastics Div., Springfield, Mass.

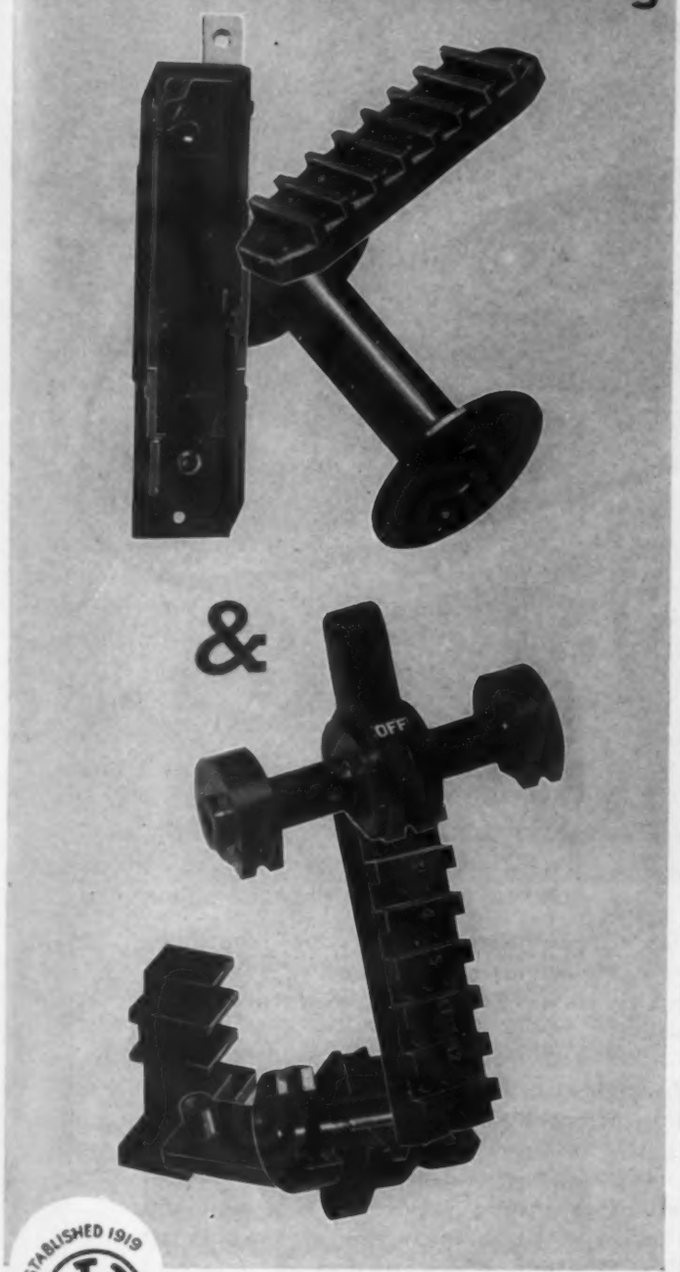
Table I shows that the shower curtain market has been almost completely saturated when it is considered that other materials are figured in the number of units. The potential for curtains looks very inviting but will require more promotion and perhaps ingenious methods of styling by matching combinations with table covers, bed spreads, and other merchandising ideas. A well-known paper drapery manufacturer has estimated 50 million

(*Please turn to page* 129)

You'll Know At Once It's

KUHN & JACOB

Fine Plastic Molding



ESTABLISHED 1919

Send Blueprints or Samples

Kuhn & Jacob

MOLDING and TOOL CO.

1200 SOUTHARD STREET, TRENTON 8, N. J.

Telephone Trenton 4-5391

CONTACT THE **K & J** REPRESENTATIVE NEAREST YOU

S. C. Ullman, 55 W. 42nd St., New York, N.Y.
Telephone — Penn 6-0346

Wm. T. Wyler, Box 126, Stratford, Conn.
Telephone — Bridgeport 7-4293

Wm. A. Chalverus, 2606 N. Fifth St.
Philadelphia, Penna.
Telephone — GArfield 3-3322

Whether You Make Aircraft Enclosures or Spectacle Frames

THESE 3 SAWS WILL IMPROVE ANY KIND OF PLASTICS CUTTING

"Curled-Chip" Circular
Cool, free running at high speeds — no "gumming" of the plastic.

"Curled-Chip" Band
Hard edge, correct clearance to leave smooth, clean, nick-free edge on material being cut.

"Duratip" Circular
Teeth tipped with the toughest, hardest metal that can be used on any saw. Will not gall.

Here are these saws developed by ATKINS (the leader in industrial cutting) especially to meet the problems inherent in plastics cutting. Each has its own particular uses; between them they will cut any kind, shape or type of plastic . . . and do it *faster* and at *lower* cost. Because of their tooth design that raises the chip in a clean curling action and their clearance construction they run cooler and freer at any speed! By enabling you to standardize on just three saw types, instead of many, they reduce your saw investment, speed up and simplify your sawing operations. Get the full facts from your Industrial Distributor today.

ATKINS

ATKINS

E. C. ATKINS AND COMPANY

Home Office and Factory:
402 S. Illinois Street, Indianapolis 9, Indiana
Branch Factory: Portland, Oregon
Branch Offices: Atlanta • Chicago • New Orleans • New York • San Francisco

MAKERS OF BETTER SAWS FOR EVERY CUTTING JOB

Check
ON INJECTION MOLDING, TOO

✓ The injection molded example above is not as simple as it looks. It required use of a difficult material, freedom from warp or shrinkage, accurate gate trimming, minimum weld lines, close tolerances and high mold finish—the kind of exacting job Yardley likes.

Yardley's reputation as extruders continues to grow. No wonder, since Yardley developed so many new techniques and improved methods.

But Yardley also does a big volume in injection molding in capacities up to 16 ounces.

The same experienced engineering personnel — skilled designing service — tool and die facilities and close inspection are yours at Yardley whether it's extrusion or injection molding.

And the same widespread organization serves you promptly, intelligently, completely. Tell us your problem.

YARDLEY PLASTICS CO.

142 PARSONS AVE. • ADams 9315 • COLUMBUS 15, OHIO

paper draperies were sold in 1947. They considered this "plus business," since 80% of the women who purchased them had never used over-draperies before in their living rooms and dining rooms. Here is an indication of broadening the consumer use of a product heretofore uneconomical in other materials.

Public is never over-sold

It is a stated observation by many sales executives that the consuming American public has never been over-sold but rather under-bought. Most retailers are in accord with the premise that the very urgent needs for most consumer products have been satisfied and now it is a matter of replenishing the linen closet and selling the public on new styles and improved qualities. They, meaning she, can always use more draperies, an additional rug, a new vacuum cleaner, but even these needed but prosaic items may be set aside to fill a perpetual yen for "that simply darling dress" she noticed in the local paper. Of course, merchandising men recognize buying does not stop with a dress. With the help of smart advertising the dress now cries out for a white patent handbag or black calf — probably both — with belts to match, and, of course, shoes. To top it all a hat is a must which for some reason doesn't look the same when worn at home. Being non-returnable, another hat is bought which calls for another dress and so on ad infinitum. Vinyl figures in all of these products except the dress, and indirectly enters into the picture here through the translucent vinyl raincoats. It is estimated that half the raincoats sold to women will be vinyl without serious affecting the sales of fabric rainwear.

Regarding the yard goods estimate, the No. 1 hobby of Mrs. Consumer is sewing. The fact that this estimate is so high is a healthy indication of consumer acceptance plus the possibility that there may be uses in the home created by the ingenious housewife, which have not yet reached the market as commercially made products. She is also interested in trademarks and seals of approval, although primarily it is the quality and style of the film that has greatest appeal.

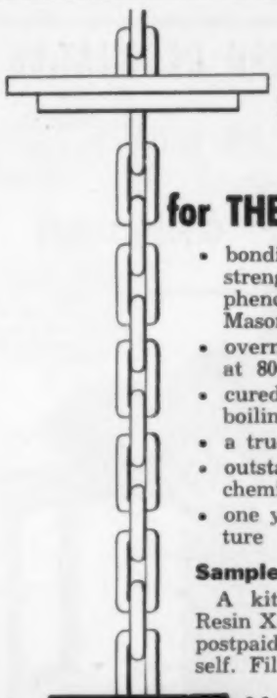
The growth of inflatable toys, mattresses, etc., indicates that here also is a latent market which needed only a product with the properties of vinyl film to be fully exploited. Since vinyl film is collaps-

Table III.—Growth of Vinyl Film Use.

	Gross national production (billions)	*Personal income (billions)*	*Industrial production*[b]	*Vinyl film (million lb.)*
1946	$204	$177	170	42
1947	230	196	186	54
1948[a]	247	211	190	79
1949[a]	255	216	195	100

[a] Estimated.
[b] 1935-1939 = 100.

91-18 VAN WYCK BLVD., JAMAICA 1, N. Y.



RESIN X-2

SUPER-STRENGTH ADHESIVE for THERMOSETTING PLASTICS

- bonding strengths *greater* than shear strengths of laminated and molded phenolics, ureas, acrylics, rubber, Masonite and similar materials
- overnight cure at 120°F., several days at 80°-85°F.
- cured adhesive unaffected by cold or boiling water, alcohol or gasoline
- a true gap filling adhesive
- outstanding electrical properties and chemical resistance
- one year storage life at room temperature

Sample Kit

A kit containing a liberal sample of Resin X-2 for test purposes is yours for $1, postpaid. Test this versatile adhesive yourself. Fill out and mail the coupon *now*.

FURANE PLASTICS AND CHEMICALS CO.
719 W. Broadway
Glendale 4, Calif.

Here's my dollar. Please rush me a sample of Super-Strength Resin X-2 adhesive at once.

NAME .....
COMPANY .....
STREET .....
CITY ..... STATE .....

IMPROVE YOUR HOT DIE STAMPING with these FINER FOILS

The appearance of the stamping you do on plastics is directly dependent upon the quality and uniformity of the foil you use.

We Supply—

PIGMENT ROLL LEAF

IMITATION GOLD ROLL LEAF

ALUMINUM ROLL LEAF

These foils are prepared by us specifically to deliver excellent printing and stamping results. They are flexible and uniform and work well in all types of hot stamping presses.

Prices and samples on request.

ALL-PURPOSE GOLD CORP.

Box 81, Brooklyn 1, N. Y.

Telephone: TRiangle 5-6266-7

New York Boston Chicago

UNIFORM GRANULATION for UNIFORM MOLD FLOW with an AMERICAN "KC" GRINDER

Thermoplastic scrap, sprues, gates and rejects are reduced quickly and economically with an efficient American "KC" Grinder. Uniform granulation is achieved in a fast, once-through operation, by the clean, shearing process of the cutting blades and the sizing of the screen—fines are held to a minimum. Capacities from 200 to 450 pounds per hour.

Heavy duty welded steel plate construction resists structural damage from accidentally fed metal inserts.

Write for your copy of "Grinding Plastics Scrap Profitably".

American PULVERIZER CO.

Originators and Manufacturers of Ring Crushers and Pulverizers

1117 Macklind Ave.
St. Louis 10, Mo.

ible and ships easily, it is ideally suited for premiums. It also capitalizes on characters out of the comic strips, such as Al Capp's "Schmoo," "Puncho," and other well-known animals and characters, all of which make up a large market for vinyl film.

In Table II, it is found that the handbag industry is taking the large portion of vinyl. The 68 million unit estimate is a new high in the handbag industry, due primarily to the fact that Mrs. Consumer could buy three or four styles of handbags in a single year at approximately the former price of one. Here again it seems to be a case of style quality rather than wearing quality, and there need not be a reduction in the sales of handbags made from other materials, for the net result is that the average woman now has more accessories to accentuate her charms.

The fastest growing section of the vinyl industry, poundage-wise, is the upholstery field. Certain coated fabrics are being replaced with vinyl-coated fabrics and vinyl unsupported film. Twenty mil film is being used as decorative panelling for cocktail bars, dens, and offices. Upholstery manufacturers are gradually learning the proper applications of plastic to cushion and over-stuffed furniture pieces, although a broader educational program is needed. Manufacturers of "flat-ware" such as kitchen furniture, have readily adopted 12 mil unsupported film for its beauty, low cost, and ease of application.

Vinyl film bids fair to capture a good part of the luggage market and probably will induce people to buy more luggage, due again to potential lower costs.

The automotive industry has favored supported film, but unsupported film, highly styled in quilted and embossed patterns, is being considered for new models.

Some shoe manufacturers are showing interest in electronically perforated vinyls as well as copolymers. Considering the 1947 production of 450 million pairs, a realization of only 25% is a potential worth going after.

Vinyl exceeds economic trends

It was apparent in the early part of 1948 that the vinyl industry would exceed the country's economic trends of the past two years. However, there were only a few far-sighted enough to forecast the tremendous surge which vinyl films have taken as indicated in Table III.

The real growth of vinyl film will fall to the printers, embossers, fabricators, and retailers in design, styling, creating new textures, new style uses, and smart merchandising. This will be implemented by constant improvements of quality and properties by resin and film processors, who will also assume the major responsibility of keeping the standards high within the industry and continue to promote the use of vinyls by national advertising.

Clear Winter Windshields

with

De Frosties

***DEFROSTIE,** held in place by two rubber suction cups, is easy to install or remove. DeFrosties fit all cars. Sold by gas stations and accessory stores. Manufactured for Peters and Russell, Inc., Springfield, Ohio.*

ANOTHER MACOID-MADE PRODUCT

THE IDEA: To concentrate warm, defrosting air on the windshield, thus clearing it quickly.

THE PROBLEMS: To accomplish this without hindering driver's vision . . . make design blend with windshield . . . attach securely to windshield.

THE RESULT: Macoid selected proper transparent material so that vision not impaired . . . engineered and produced molds . . . planned and set-up production . . . assembled parts . . . boxed whole unit. Now produces and ships many DeFrosties.

LET MACOID'S combined facilities of designing, engineering, and production be of service to you. At no obligation, a Macoid representative will discuss plastic application to your product.

Originators of Dry Process Plastics Extrusion

DETROIT **MACOID** CORPORATION

Extrusion and Injection Molding • 12346 CLOVERDALE, DETROIT 4, MICH.

Adhesives

(*Continued from page 98*)

with Grade C laminate. Table XIII shows the data.

Striking differences in shear strength resulted from variations in the thickness of layer of adhesive if the adherends were unable to move closer together as the adhesive shrank. This condition will exist in an assembly if the surfaces being bonded together are forcibly held a fixed distance apart. Although Resorcinol A/Primer A in general has much higher strength than Phenol A, this marked advantage is lost if the space between adherends exceeds about 0.010 inch. Phenol A is apparently just as effective in layers up to ⅛ in. thickness as in bonds in which a thin layer is possible. As shown in Table XIV, the addition of kaolin as a filler in Resorcinol A/Primer A provides reasonably good bonds in thicknesses up to about 1/32 in. but these values are markedly less than those which are considered standard for Resorcinol A/Primer A used in thicknesses less than 0.010 inch.

It appears, then, that catalyst ratio, open assembly time, type of laminate employed, surface condition of the laminate, and gaps between bonded parts can all affect shear strength greatly, but these are all variables which can be controlled readily in the assembly shop or in the original design if their importance is recognized.

After elimination of the variations due to these factors, there still remains a considerable variation which is either inherent in the materials or whose cause has not yet been isolated and brought under control. The data in Table XV show that an occasional group of specimens will be prepared which will be significantly different from the average. In one instance, this group is inferior in maximum, average, and minimum shear strength to the other groups with which it is comparable. In the other instance, one group is noticeably superior in all three values to other comparable groups. No means of eliminating the low groups has yet been found and, accordingly, it is necessary simply to allow for this contingency in design. It is for this reason that the maximum reliable shear strength value for Resorcinol A/Primer A is set at 590 p.s.i. and for Phenol A at 150 p.s.i. rather than at values closer to the averages which have been found.

(*Please turn to page 134*)

Table XIV.—Effect of Clearance Between Adherends on Shear Strength of Bond.

Clearance	*Shear strength*			
	Minimum	*Maximum*	*Average*	*St. dev.*
in.	*p.s.i.*	*p.s.i.*	*p.s.i.*	*p.s.i.*
Resorcinol A/Primer A adhesive				
0.011	520	740	632	88
0.022	330	600	433	101
0.062	0	0	0	.....
(Resorcinol A/Primer A)/kaolin (79:21) adhesive				
0.031	360	460	418	41
0.094	30	280	138	92
0.125	0	50	17	.....
Phenol A adhesive				
0.062	480	580	503	44
0.094	200	410	298	101
0.125	180	310	240	60

Table XV.—Tests for Variation from Batch-to-Batch of Adhesive and From Operator-to-Operator.

Experiment No.	*Operator*	*Batch*	*Shear strength*			
			Minimum	*Maximum*	*Average*	*St. dev.*
			p.s.i.	*p.s.i.*	*p.s.i.*	*p.s.i.*
Resorcinol A/Primer A adhesive						
1	1	1	708	1064	930	124
2	1	1	900	1052	990	60
3	1	1	900	1140	1050	99
Data on combined experiments 1, 2 and 3	1	1	708	1140	973	92
4	2	1	900	1040	977	51
5	2	1	908	1028	975	38
6*	2	1	680	960	778	36
Data on combined experiments 4 and 5	2	1	900	1028	976	44
7	2	2	660	1120	890	132
Phenol A adhesive						
8	1	1	180	302	244	40
9	1	1	220	296	270	26
10*	1	1	306	640	445	142
Data on combined experiments 8 and 9	1	1	180	296	257	34
11	2	1	230	340	280	44
12	2	1	160	434	300	100
Data on combined experiments 11 and 12	2	1	160	434	290	74
13	2	2	170	450	300	66

* The results of this experiment do not fall within two standard deviations of the other results and are therefore disregarded in calculation of the combined experiments.

Now **A POLYMERIC PLASTICIZER AT A MONOMERIC PRICE—**

PARAPLEX G-50

PARAPLEX G-50 now costs 39½c a pound* in quantity—actually less than most monomerics!

When PARAPLEX G-50 joined G-25 and G-40 as a polymeric plasticizer for vinyl compounds, it combined for the first time these great advantages: the permanent plasticizing effect and non-migratory characteristics that only a high-molecular-weight modifier can show, *plus* the simplicity of processing and ease of handling that once were exclusive properties of the monomeric plasticizers.

Now there's another important advantage —the new low cost of PARAPLEX G-50— that brings the qualities of this resinous plasticizer to the whole range of vinyl processing methods and vinyl applications: to extruding, calendering, molding, dispersion compounding, and to coated fabrics, electrical insulation, and both light and heavy weight film.

*F. O. B. PHILADELPHIA

If you have thought of PARAPLEX G-50 as a necessity in your high-cost, highest-quality vinyl production only . . .

If you have evaluated the permanence of PARAPLEX G-50, or its unequalled pigment-grinding ability, or its adaptability to dispersion compounding . . .

Or if you have only glanced wistfully at this plasticizer's freedom from odor or taste, or at its resistance to extraction, its processing ease, its non-migratibility . . .

Contact us immediately. Our technical staff will be glad to answer any questions you may wish to ask about your use of PARAPLEX G-50—the polymeric plasticizer at a monomeric price.

PARAPLEX *is a trade-mark, Reg. U. S. Pat. Off.*

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square Philadelphia 5, Pa.

The Resinous Products Division was formerly The Resinous Products & Chemical Company

Table XVI.—Shear Strength of Grade C Laminate Bonds Made with Room Temperature Setting Urea-Formaldehyde and Furane Adhesives.

Adhesive	Shear strength without primer			Shear strength with primer A		
	Minimum	Maximum	Average	Minimum	Maximum	Average
Urea-formaldehyde resin	*p.s.i.*	*p.s.i.*	*p.s.i.*	*p.s.i.*	*p.s.i.*	*p.s.i.*
1	120	144	134	370	750	593
2	80	140	105	480	900	603
3	0	136	85	320	700	516
4	44	74	58	400	760	616
5	0	0	0	500	850	710
6	0	44	32	420	650	523
7	0	120	58	440	550	496
8	0	0	0	450	720	623
9	0	0	0	590	920	750
10	0	0	0	470	550	513
11	0	0	0	540	790	653
12	0	0	0	370	600	520
13	0	0	0	500	640	590
14	0	0	0	460	830	690
15	0	0	0	610	910	716
16	0	0	0	300	800	543
17	0	0	0	350	440	386
Furane resin 1	104	430	308			

In the limited number of batches investigated, no significant differences were found. In the two operators investigated, however, noticeable differences in standard deviations can be seen. This would seem to indicate that differences in technique affect dispersion of results and that variability in the materials is not necessarily a primary problem. However, the development of a material which is less sensitive to conditions of application would enable the adhesive to be employed under more severe loads than can now be reliably predicted.

Alternative thermosetting adhesives include, of course, urea-formaldehyde and the furfuryl alcohol types of adhesives. A preliminary survey of the known commercially available materials of these types in Table XVI shows that the urea-formaldehyde materials are not particularly adapted to bonding phenol-formaldehyde laminates and that the furfuryl alcohol type material gave rather erratic results with at least two values lower than any of those obtained for Phenol A. A similar preliminary survey of the thermoplastic adhesives included the room temperature vulcanizing rubber type as well as cellulose nitrate, acrylate, polystyrene, and rubber type adhesives which attain strength simply by solvent evaporation. The data in Table XVII show that none of the materials tested approach the phenol-formaldehyde type adhesive in strength in this type of application.

Table XVII.—Shear Strength of Grade C Laminate[a] Bonds Made with Various Adhesives[b].

Adhesive	Shear strength		
	Minimum	Maximum	Average
	p.s.i.	*p.s.i.*	*p.s.i.*
Rubber type			
Synthetic rubber 1 (room temp. vulcanizing)	63	109	88
Synthetic rubber 2 (room temp. vulcanizing)	42	64	51
Natural rubber	27	37	31
Reclaim rubber 1	55	85	64
Reclaim rubber 2	21	25	24
Reclaim rubber 3	50	84	65
Reclaim rubber 4	20	30	23
Phenol-formaldehyde/GR-A rubber	50	80	60
GR-M rubber	14	20	17
Thermoplastic type			
Cellulose nitrate[c]	25	77	46
Acrylic[c]	12	27	19
Polystyrene[c]	5	10	7

[a] Federal Specification HH-P-356, Grade C, Type II, 1/16 in. thick.
[b] Bonded assemblies were cured for a total of 72 hr. at 25° C., 50% relative humidity, with 1 p.s.i. contact pressure applied for the first 16 hours.
[c] Not completely dry at the end of 72 hr. at 25° C., 50% relative humidity.

Conclusions

Among materials which set at room temperature, it appears that there is considerable difference in the strengths obtainable with the various commercially available adhesives, even within a restricted chemical type.

Resorcinol A/Primer A used to bond laminates will give a dependable strength of about 590 p.s.i., providing conditions of materials and applications are properly controlled. Phenol A used without primer will give a reliable shear strength of about 150 p.s.i. providing corresponding precautions during assembly are observed.

Both of these materials are highly resistant to heat and to cold and are unaffected by ester type and aromatic type solvents. The water resistance of Resorcinol A/Primer A is excellent and that of Phenol A is fair.

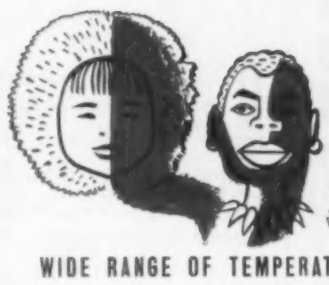
Announcing

DIOCTYL PHTHALATES

AERO* DOP (di-2-ethyl hexyl phthalate)

AERO* DOPI (di iso octyl phthalate)

Cyanamid's High Quality Plasticizers for Vinyl Resins



FOR WIDE RANGE OF PRODUCTS

WIDE RANGE OF TEMPERATURES

LABORATORY-CONTROLLED PRODUCTION

Cyanamid is now producing AERO DOP and AERO DOPI in commercial quantities. These plasticizers offer compounders of vinyl resins everything they are looking for in such a material — low heat loss, low brittle point and good compatibility. They remain liquid down to temperatures in the neighborhood of —50° C, thus keeping the vinyl flexible over an extreme temperature range.

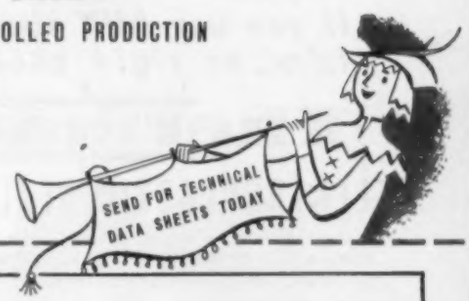
All these properties make AERO DOP and AERO DOPI ideally suited for compounding vinyl resins into films — for upholstery, drapery materials, shower curtains, imitation leather, handbags, beach mattresses, raincoats, adhesives, shoe products, and extruded tubing. Films so plasticized retain their flexibility, assure years of continuous service.

AERO DOP and AERO DOPI are excellent plasticizers for nitrocellulose and synthetic rubber where high tensile strength, low temperature flexibility, and resistivity are desired.

The outstanding electrical properties of AERO DOP and AERO DOPI spell better service for vinyl resins used for wire coating.

AERO DOP and AERO DOPI help the manufacturer develop, from vinyl resins, products with special sales appeal. They aid in getting extra toughness, dryness, smoothness to touch, and bright coloring. These plasticizers improve the working qualities of vinyl resins . . . make them more adaptable to the latest, low-cost production techniques.

For complete data on physical properties and specifications, simply use coupon at right. *Trademark



AMERICAN *Cyanamid* COMPANY

INDUSTRIAL CHEMICALS DIVISION

30 Rockefeller Plaza, New York 20, N. Y.

Gentlemen: Please send technical data sheets describing AERO DOP and AERO DOPI.

NAME_____

POSITION_____

COMPANY_____

ADDRESS_____

Because we have the "Know-How" and the specialized equipment

METAL FABRICATORS WILL FINISH YOUR PLASTIC MOLDS

PHOTO COURTESY HYPREZ DIVISION ENGIS EQUIPMENT COMPANY, CHICAGO

—More Economically
—More Efficiently
—More Quickly

The magic of HYPREZ Diamond Compounds and Vapor Blast Liquid Honing plus Metal Fabricators skill and experience developed in the service of "The Best Names In The Industry" combine to give you the kind of custom-finishing your plastic molds deserve. We welcome the most intricate assignments in Lapping, Finishing and Polishing. Since our methods and extensive equipment are time-saving investments . . . you enjoy genuine economies and consistently high quality workmanship.

REFERENCES CHEERFULLY SUBMITTED
Please address communications to

METAL FABRICATORS, 1289 Nottingham Way, Trenton, N. J.

IMPERIALYTE VINYL PLASTIC
VINYLITE
Velon
Geon
Koroseal
WATASEAL
Boltaflex
DU PONT

If you use ANY thermoplastic film, or rigid sheeting, the

Thermatron

ELECTROPLASTIC SEALING SYSTEM

opens the way to better quality, lower cost and permits the manufacture of new improved items impossible of production by present and conventional methods.

The THERMATRON electroplastic sealing line is complete. Its design, construction and dependability have made it preferred equipment in hundreds of progressive plants the nation over — and in many foreign countries.

Standard units adaptable to almost any application — in stock for prompt delivery. From a single unit to an entire plant.

Send for folder F-2 — or better yet, describe your problem and send samples.

THERMATRON DIVISION
RADIO RECEPTOR CO., INC.
253 W. 19th Street, New York 11, N. Y.

Eyeglass frames, made of cellulose nitrate, are sold in two colors. They are designed to emphasize the brow line

Plastic-Top Eyeglass Frames

DESIGNED to accentuate the brow line, the plastic-crowned eyeglass frames, illustrated above, are made of celluose nitrate and sold under the trade name of Browline. Manufactured by the Shuron Optical Co., Inc., Geneva, N. Y., the frames are produced in two colors: Cordova, the color best blended for all-around color acceptance; and "ultra violet." for women whose complexions demand a color that blends with their make-up.

The main cosmetic advantages of Browline over some other types of eyeglass frames are that they are less obtrusive, and that they do not cast shadows under women's eyes. The plastic fronts are made in three different models: the Stag, designed for men; the Fiesta, for both men and women; and the Senora, for women who wish to emphasize uplifted brow lines. The temples, also, are made in three varying models.

For assembly purposes, one end of the eyewire anchors to one of the rivets holding the pad arm assembly. The other end of the eyewire connects to the endpiece hinge by means of a steel screw. For lens insertion, the screw only has to be backed up a few threads instead of being removed. All fronts and temples are interchangeable.

Industry setting new standards of accuracy with new TIMKEN® "Double-Zero" bearings!

UNTIL recently, the most accurate Timken® bearing on the market has been the "Zero" bearing, with a maximum run-out of only 150 millionths of an inch. Then, just a few short months ago, The Timken Roller Bearing Company introduced the "Double-Zero" bearing, with a maximum run-out of 75 millionths of an inch—*twice* as accurate as the Timken "Zero" bearing!

Within the short time since, one industry after another has begun to take advantage of the increased accuracy of the new "Double-Zero" bearing by applying it on grinding machine spindles, small precision rolling mills, gear cutters, lathe spindles, and many other applications where extreme accuracy is essential.

"DOUBLE-ZERO" BEARING IS A "GENERATED UNIT ASSEMBLY"

To achieve the extreme accuracy of the "Double-Zero" bearing, Timken engineers built specialized machine tools, developed measuring devices of extreme accuracy, and perfected new manufacturing processes.

Then, to assure positive roll alignment, long lasting precision, permanent adjustment, and smoother operation, the "Double-Zero" bearing goes through an extra step in manufacture. A natural and true geometric contact is generated between all rotating parts, which results in a "Generated Unit Assembly".

The new "Double-Zero" bearing is the latest example of Timken leadership in serving the bearing needs of all industry. Whenever you buy bearings, it pays to look for the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

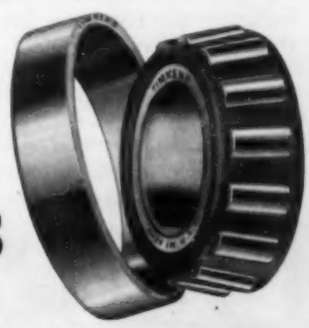
This symbol on a product means its bearings are the best.

A PRECISION TIMKEN BEARING FOR EVERY REQUIREMENT			
CLASS	**"00" (DOUBLE-ZERO)**	**"0" (ZERO)**	**"3" (THREE)**
RUN-OUT	.000075"	.000150"	.000300"
TYPES AVAILABLE	Standard Single Row	Standard Single Row	All types
SIZE RANGE	Up to 10" O.D.	Up to 12" O.D.	Up to 12" O.D.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

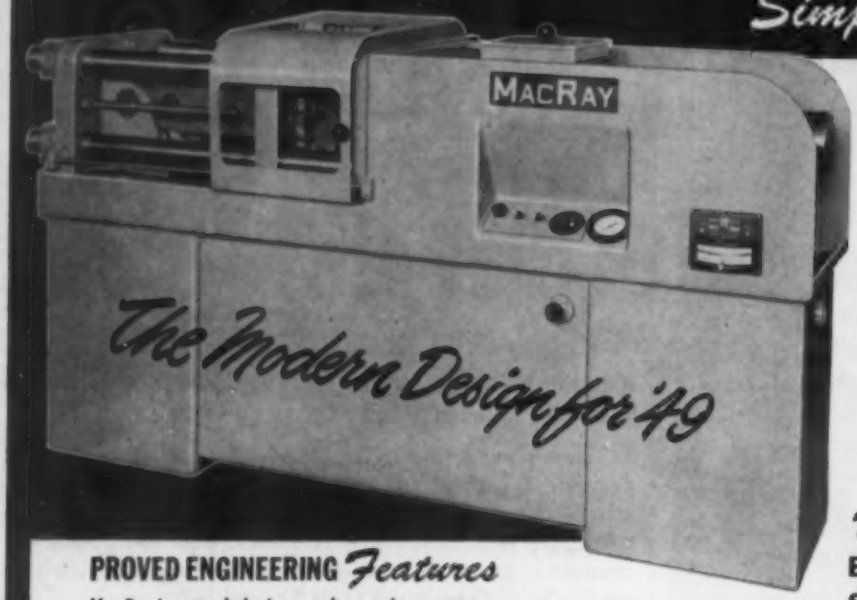
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION →✳←

MACRAY INJECTION MOLDING MACHINE

Sets New Standards of Performance, Simplicity and Economy



★ 3 OZ. RATED CAPACITY
★ UNUSUALLY LOW IN COST
★ RUGGED CONSTRUCTION
★ SEMI-AUTOMATIC CYCLE

Here's a new "top-performance" plastics press...at a "down-to-earth" price! Combining many tested and proved features—the MacRay Model No. 3 turns out practical, volume production—handles a wide range of jobs on a profitable basis. It will pay you to get the full facts about this unusual machine.

Write FOR FREE BULLETIN, PRICES, SPECIFICATIONS

PROVED ENGINEERING *Features*

MacRay's sound design and superior construction features assure fast, dependable operation. Clamping and injection mechanism, heating cylinder and hydraulic system are simple and efficient—offer trouble-free performance. Investigate the advantages for your plant. Write today—no obligation!

MACRAY ENGINEERING CO.

6611 EUCLID AVENUE · CLEVELAND 3, OHIO

---

special design

PRODUCTION LINE H. F. HEAT SEALING EQUIPMENT

It's your out of the ordinary, heat sealing problems that Lee looks for. Our development engineers tackle any unusual assignment—even those which have been called "impossible".

Lee service consists of designing, manufacturing and installing special H. F. generators and automatic and semi-automatic heat sealing production lines. Many leading manufacturers are receiving day after day production from Lee-built heat sealing equipment which, because of its special design, is doing jobs no other equipment can.

We suggest you contact Lee today to fill your requirements for custom-built heat sealing equipment for production line operation.

LEE *Products, inc.*

707 NEW YORK AVENUE
UNION CITY, NEW JERSEY

Miller
WOOD FLOUR

Formulated to meet the strict requirements of the plastic industry. Miller Wood Flour is an approved uniform product. Available in 4 standard grades, or made up to meet your particular specifications.

Prompt Shipment.
Phone, wire, write us regarding your requirements.

Frank Miller & Sons

2246 West 58th Street, Chicago 36, Illinois

IMPORTANT:

The NEW GERING COLOR CONVERSION PLAN

GERING COLORS YOUR CRYSTAL POLYSTYRENE

GERING COLOR CONVERSIONS COSTS AS LOW AS 5½¢ LB.

GERING SAVES YOU DOLLARS

YOU

FURNISH CRYSTAL POLYSTYRENE OF YOUR CHOICE !

GERING

WILL MAKE ANY COLOR !

DON'T DELAY!

Write today for our latest price schedule with complete information. It will mean greater savings and excellent performance.

The new Gering Color Conversion Plan is a service you can't afford to miss! It means big savings in time and cost! Here it is: You furnish us with the crystal polystyrene of your own choice. We will color process in "standard" or "special" colors and return pelleted, dust-free styrene with better mold release, faster molding cycles, and fewer rejects.

GP

PLASTIC MATERIALS

Gering Engineering Makes Fine Plastics Better

GERING PRODUCTS, Inc.

CABLE ADDRESS: GERING — KENILWORTH, NEW JERSEY

ASK STOKES

If you're Planning in Plastics... First see Stokes' NEW 741* Press

You can plan for high and continuous production of small parts from powder at truly low unit cost . . .

You can plan to economize by using standard molds from your older presses . . .

You can plan for fully automatic production of parts not previously practical for this type of work . . .

You can plan to save on labor . . .

These fully automatic hydraulic presses are compact and self-contained. They have automatic feed and discharge, automatic cycle control, top and bottom knock-out, and provision to operate semi-automatically for inserts. One man can run 6 to 10 of them. Even your night watchman can be "an experienced operator" because he has only to fill the hopper and take away the finished parts. Any possible disruption of continued operation merely shuts off the machine.

Completely automatic operation pays big dividends.

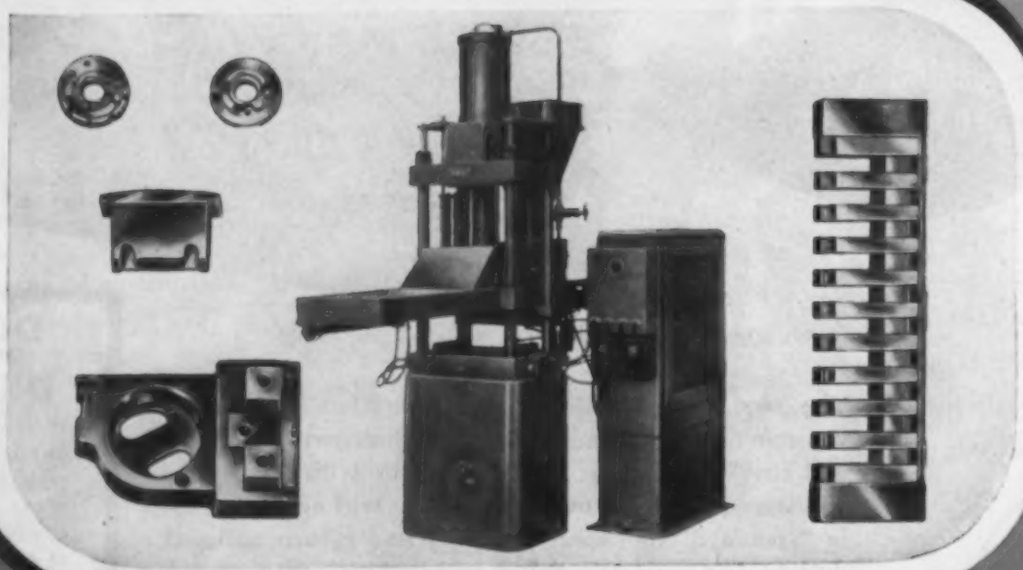
Send for literature on the new Stokes 741 press.

F. J. Stokes Machine Co., **5934** Tabor Road, Philadelphia 20, Pa.

FJS

*Patents Pending.

Stokes makes Semi-Automatic and Automatic Molding Presses, Plunger Presses, Closure Presses, Preforming Presses, Industrial Tabletting and Powder Metal Presses, Vacuum and Special Processing equipment, Water Stills and Special Machinery.



Typical Plastic Parts Molded on the 741 Press.

STOKES KNOWS HOW

Light Control Switches

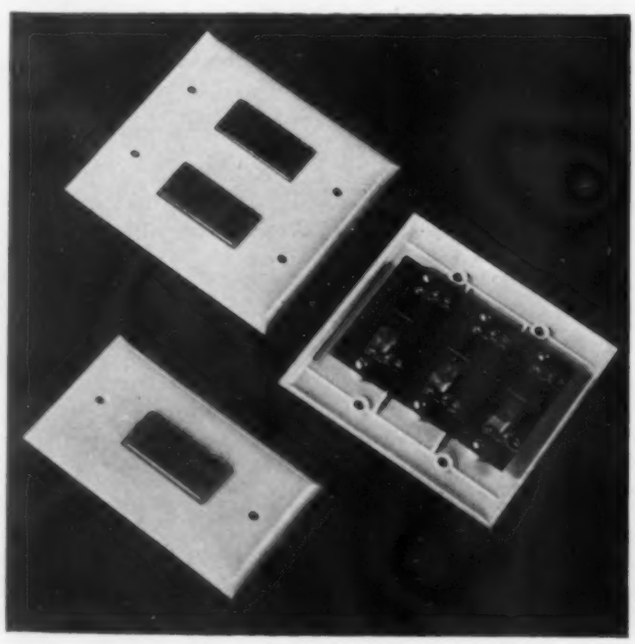
A NEW low-voltage residential wiring system introduced by the Touch-Plate Co., Inc., Los Alamitos, Calif., which makes decorative and functional use of thermoset plastics, controls lights in the home by a touch on the control switches.

The Touch-Plate system involves the use of low-voltage wire such as that required for wiring of a buzzer or bell; a transformer to reduce the voltage; relays which do the actual switching of the 110-volt circuits; and "Touch-Plates" which take the place of toggle or push switches.

The plates themselves have ivory urea formaldehyde frames and brown or black phenolic touch units, both molded by Reinhold-Geiger Plastic Co., Los Angeles, Calif.

The new wiring and switch system is claimed to eliminate as much as 40% of the cost of conventional wiring, with conventional switches, which requires metal conduits and heavy insulation and is high in installation cost. Since the switches operate by a mere touch on a flat surface, which is set flush with the wall and has no protusions to catch clothing, persons carrying parcels may turn on lights by merely touching the plates with elbow or shoulder. Because the system operates on 24 volts AC, there is no danger of shock at the switch. Finally, it is possible to have, at low cost, multi-switch control of any light or single-control of all lights in the house from any one switch point. Touch-Plates come in single, two, or three gang models, or with special controls.

Switches for new wiring system have urea frames and phenolic touch units. The system involves usage of low voltage wire



See STANLEY for

VINYL INKS

for rotogravure and silk screen printing

ORGANOSOLS

For fabric or paper coatings . . . for dipping

PLASTISOLS

for moulding or coating

As one of the oldest and most experienced formulators in the Vinyl field, Stanley is fully equipped to formulate and recommend a coating for your specific need. *Consult* STANLEY CHEMICAL CO., EAST BERLIN, CONN. *for the correct answer to your problems.*

STANLEY CHEMICAL

INDUSTRIAL COATINGS

LACQUERS SYNTHETICS JAPANS ENAMELS

Complete Information on Every Phase of the Plastics Industry

- All the Essential Facts and Figures
- All the New Processes and Products
- All the Latest Methods and Machinery

New Second Edition of the

HANDBOOK OF PLASTICS

By HERBERT R. SIMONDS, Consulting Engineer Specializing in Plastics, ARCHIE J. WEITH, Formerly Director of Research and Development, Bakelite Corporation, and M. H. BIGELOW, Director of Technical Service, Plaskon Division, Libbey-Owens-Ford Glass Company.

So complete is this great book in every detail, so skillfully has it been organized and indexed that you can turn to its pages with full confidence of finding, instantly, the answer to every question about plastics. It covers them exhaustively from raw materials to finished products, including details of the manufacturing methods, machinery and processes, and the innumerable articles into which they are fabricated.

It includes plastics of all compositions and all manufacturers, with the specific properties which determine their applications and their use. It gives this information for all the commercial plastics, textile fibers, rubbers and elastomers, natural resins, films and sheetings, laminates and plywoods, coatings, adhesives and other related materials.

For every individual commercial plastic material it gives all the known properties—physical, thermal, mechanical, chemical, physico-chemical, electrical—and preferential methods of processing, fabricating and finishing. There is complete information for designing plastics parts, the molds for making them and every step in actual production.

Immense sections, practically books in themselves, cover such important matters as chemistry, analytical methods, plastic patents, cost accounting in the industry, etc., etc. An immense index, a list of trade names and trade marks, a great general glossary, and up-to-the-minute solvent and plasticizer tables put at your command all the information of the entire industry.

This Great Second Edition Is a Completely New Book

The immense development of the plastics industry in the past ten years is strikingly shown by the complete revision and great increase in size of the HANDBOOK OF PLASTICS. Besides its new features and new data, it reflects in full the extensive recent commercial application of the discoveries and developments of the war years; as well as the unprecedented array of improved processes and products resulting from peacetime research.

EXAMINE THIS BOOK FREE

MAIL THIS COUPON

D. Van Nostrand Company, Inc.
250 Fourth Ave., New York 3, N.Y.

Please send me a copy of the new second edition of the "Handbook of Plastics." After examining this book for ten days I will either return it to you or send you $25.00 in full payment.

Name .....

Business Address .....

.....

City .....

Zone ..... State .....

MP-Mar. 1949

So Simple Anyone can

ENGRAVE

on Plastic and Metal

Send for descriptive folder.

NEW HERMES PORTABLE

The handy, accurate machine that every plant NEEDS for speedy production lettering of name plates, small panels, novelties, serial numbers, part numbers, etc.

NEW HERMES

13-19 University Place • New York 3, N.Y.

SHORTAGE of COLORED STOCK?

Mold or fabricate your plastic items in clear or white, then color them quickly and cheaply by a simple dip-dye.

"REZ-N-DYE"

Available in 21 standard colors.
Write for descriptive literature.

Schwartz CHEMICAL CO., INC.

326-328 WEST 70th ST., NEW YORK 23, N. Y.

Blind-Hole Locking Inserts

with a variety of heads are produced by molding polystyrene around steel supports

PLASTIC-covered, steel-centered refrigerator shelf supports, dashboard plugs, ornamental knobs, and other similar items are being produced which can be installed in blind holes from one side of any panel and securely locked by means of a spring wire.

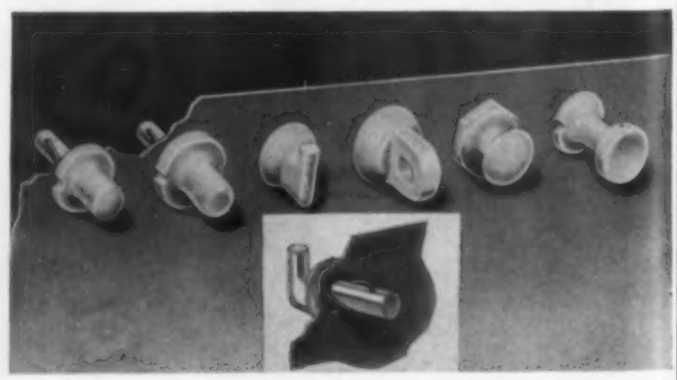
The new Spring-Lock inserts, now produced with a variety of heads by the Simmons Fastener Corp., Albany, N. Y., were originally designed for refrigerator shelf supports. In this application plastics are favorably received since they do not corrode under conditions of high humidity.

All of the inserts are produced by molding polystyrene around steel supports which pass through the entire length of the polystyrene covering, thereby providing rigidity and materially improving the physical characteristics of the plugs.

The locking spring wire, which is gripped by the steel insert, is twisted at installation, thus insuring high torsional strength to withstand vibration, and at the same time making possible rapid, labor-saving installation. The plastic plugs are installed simply by inserting in a hole from one side of a panel and twisting a quarter of a turn to lock. Both original installations and replacements can be made in this way without requiring accessibility to the back of the panel.

Although polystyrene is the only plastic used in the Spring-Lock inserts at present, other plastic materials may be used where conditions call for specific characteristics. For example, under test are Spring-Lock feet for electric toasters and waffle irons, in which thermosetting materials are being used.

Heads of inserts can be made any desired shape. After insertion in panel, a quarter turn locks plug firmly in place



the Cole Pyrometer

BUILT ESPECIALLY FOR YOUR REQUIREMENTS!

- Easy one hand operation
- Full temperature range — quick reading
- Replaceable tip and couple

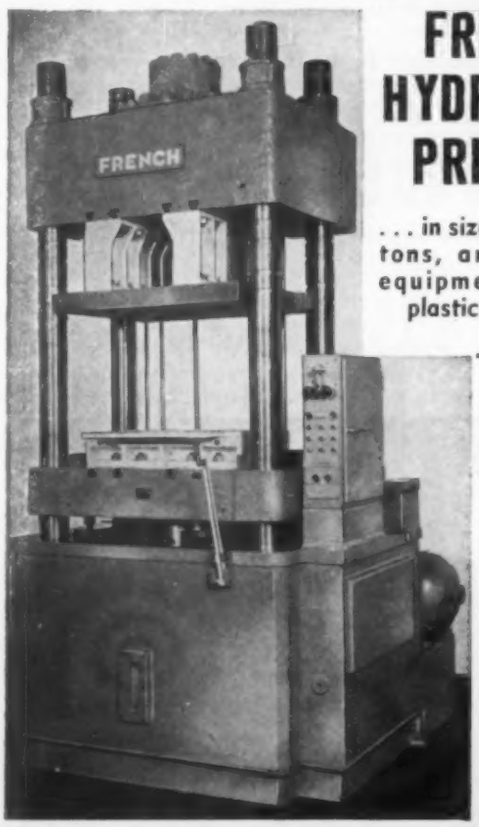
The "gooseneck" flexible shaft containing the thermocouple tip of the Cole Pyrometer enables you to gauge the temperature of any spot in a mold, press or extruder, no matter how inaccessible it may seem.

A single unit, with no wires to snag on other equipment, the Cole Pyrometer is accurate, built to withstand industrial hazards. Eight scale ranges are available—from 0°-300° F. to 0°-1200° F.

The Cole Pyrometer is a reasonably priced, precision instrument. Write for Bulletin No. 94807 today.

COLE INSTRUMENT CO.

1320 SOUTH GRAND AVE. • LOS ANGELES, CALIF.



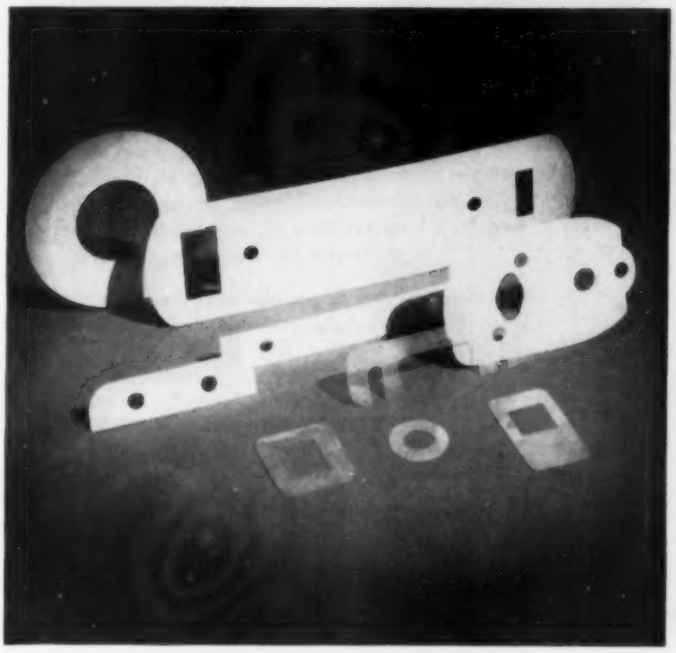
FRENCH HYDRAULIC PRESSES

. . . in sizes up to 1,500 tons, are standard equipment in the plastics industry.

Write for our catalog

THE FRENCH OIL MILL MACHINERY CO.
(HYDRAULIC PRESS DIVISION)
PIQUA, OHIO U.S.A.

COMPLETE FACILITIES FOR PRECISION-FABRICATED PLASTICS



It Pays to Call on SILLCOCKS-MILLER

Nationally recognized for quality production, the Sillcocks-Miller Company applies its long experience, skill and modern facilities to the fabrication of plastic materials, specializing in close-tolerance work.

This organization of specialists is equipped to handle all of the important plastic-fabricating processes, such as cutting, printing, stamping, cementing, milling, turning, blanking, drilling, drawing, forming, laminating and assembling.

Along with these facilities, Sillcocks-Miller offers a consulting service to assist you in developing your ideas in plastics. Write for illustrated booklet or send specifications for quotation.

The SILLCOCKS-MILLER CO.
10 West Parker Avenue, Maplewood, New Jersey

Quality and Service at a Price that's Right

Save Time STARTING PRODUCTION with DME STANDARD MOLD BASES

With DME standardized mold bases for injection molds . . . all ready for ejector pins, cavities, cores and water lines . . . you can start molding operations with no lost time. All of your preliminary engineering is done for you; time-consuming and costly machining of bases is unnecessary. DME standardized mold bases are economical, too; they cost less than custom-built bases and more than half their parts can be used over and over.

Immediate delivery of popular sizes from two plants.

Full information and engineering layouts in catalog M. Yours for the asking.

DME
DETROIT MOLD ENGINEERING COMPANY
DETROIT 12, MICH. • HILLSIDE (Near Newark), N. J.

PEARL ESSENCE

"astralucine brand"

Types for every plastic and purpose.

Write for your free copy of our informative technical bulletin "Pearl Essence Finishes—What They Are & How to Use Them."

argenta PRODUCTS CO.
EASTPORT MAINE

Polyethylene Pipe and Fittings

COMMERCIAL production of a line of polyethylene pipe and fittings for use in chemical handling lines, coolant lines, and similar applications, has been announced by American Hard Rubber Co., New York, N. Y. Polyethylene is well suited to such uses because of its resistance to many chemicals, its good low temperature properties and impact strength.

Pipes and fittings are threaded

The pipes are being extruded in 10 ft. lengths and in diameters ranging from ½ to 2 inches. The tubes may be threaded with the same type tools that are used to thread metal pipes. However, the tools used must be very sharp and a chamfer should be formed to aid in starting the thread. When threading, the tool must be backed off frequently and carefully.

The pipe fittings—reducers, 90° and 45° elbows, companion and blind flanges, pipe caps, Ts, and couplings—are injection molded, with the threads molded in. It is reported that at normal temperatures the threaded fittings will withstand pressures up to 50 p.s.i. without leakage. In some cases they may be used at pressures as high as 100 to 150 p.s.i.

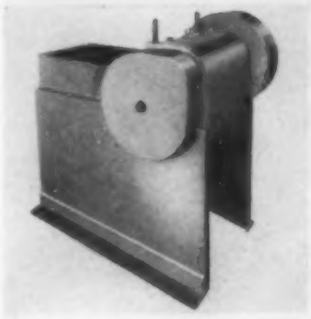
Insoluble in most solvents

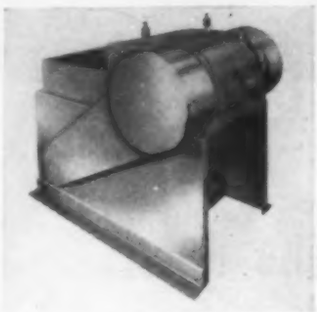
The all-black polyethylene pipes and fittings, which are sold under the trade name of Ace, are insoluble in all common solvents at temperatures up to 50 to 60° C., with the exception of chlorinated solvents and aliphatic and aromatic hydrocarbons at elevated temperatures.

Pipes are extruded and fittings are injection molded of polyethylene. Threads are cut in pipe, molded in fittings

Cumberland Machines for the Plastics Industry

New!





CUMBERLAND ROTARY CHOPPING MACHINE

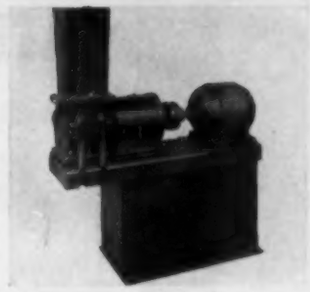
This machine cuts slab material from compounding mills, chops continuously extruded rods, sheets or stands, and cuts up calender roll side shear strips. This machine is also used in conjunction with extrusion machines to produce cube or pellet material suitable for a molding compound.

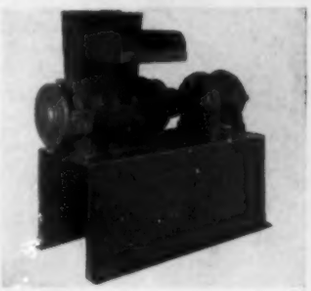
CUMBERLAND SLITTING & MANGLING MACHINE

This machine is useful primarily to manufacturers who compound plastic materials. The machine may be used to reduce material for use as a commercial product without further granulating. Or it may be used to prepare material for subsequent final reduction in a granulating machine.

CUMBERLAND PLASTICS GRANULATING MACHINES

These machines are designed especially for plastics. They perform with high efficiency the special cutting requirements of plastic materials. They are simple in design, rugged in construction and are easy to dismantle and clean. These machines are built in two styles. Nos. 0, ½ and 1½ as at top right (No. ½ is illustrated). Also, large 18" machine, double hung, with retractable knife block for complete accessibility. (Illustrated at right below.)





REQUEST CATALOGS

Plastics Granulating Machines .....No. 200
Slitting and Mangling Machine .....No. 300
Rotary Chopping Machine .....No. 400

CUMBERLAND ENGINEERING COMPANY, INC.

Dept. (A), Box 216, Providence, Rhode Island

GET BETTER and FASTER PRODUCTION on NYLON JOBS

with these production features of LESTER PHOENIX INJECTION MOLDING MACHINES

Because:

a positive and simple cut-off eliminates screen packs and other gadgets . . .

an internal heater delivers effective heat, faster and more efficiently . . .

Investigate these and other advantages.

Write us for complete details.

Elmer C. Maywald
& COMPANY Inc., 189 W. Madison St., Chicago 2, Illinois

PLASTIC MOLDS, DIES, TOOLS, GAGES

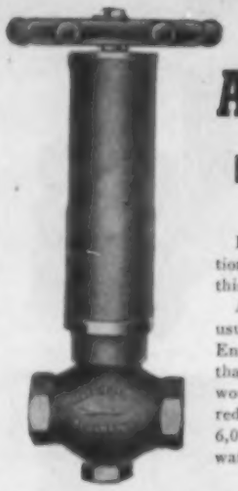
with HYPREZ DIAMOND COMPOUNDS

Effective techniques for lapping, polishing and re-polishing with Hyprez Diamond Compounds are described and fully illustrated in this new folder. The methods show fast, perfect, economical finishing, employing one or more of our 25 engineered standards.

Write today for your free copy to Dept. M-349

HYPREZ DIVISION
ENGIS EQUIPMENT COMPANY
431 So. Dearborn St., Chicago 5, Ill., U.S.A.

IT TOOK 50 YEARS



to perfect this

ATLAS Type "E"

High Pressure Reducing Valve

Last month we told you about the addition of the Handwheel shown at the top of this remarkable valve.

As every plastics man knows, design is usually an evolutionary process. ATLAS Engineers of 50 years ago did not realize that the experiences gained at that time would be incorporated into this valve which reduces, with ease, pressures as high as 6,000 lb. per sq. in. *without shock*—air, water, or oil.

Step by Step. So, step, by step, after more than 50 years, this Type "E" valve is the "last word" in high pressure regulation. The body, for instance, is entirely of forged steel. All of the internal metal parts are of stainless steel. A formed packing of special material superior to leather is used which is immune to all fluids commonly used in hydraulic machinery. The pressure on the seat is balanced by a piston with the result that variations in high initial pressure have little effect on the reduced pressure. And so on. Complete data on request.

For other ATLAS plastics plant products see the partial list in our ad in the January 1949 issue of MODERN PLASTICS

ATLAS VALVE COMPANY

REGULATING VALVES FOR EVERY SERVICE

277 South Street, Newark 5, N. J.

Represented in Principal Cities

SPECIAL SMALL EQUIPMENT

for plastic, optical, celluloid and allied industries

This Foot Toggle Press and several other sizes and styles of Hand Lever Presses handle economically embossing, drawing, and degating jobs in plastic manufacturing concerns. Prompt delivery.

Specialists in Injection Mold Making
also Transfer and Compression Molds

STANDARD TOOL CO.

83 WATER STREET, LEOMINSTER, MASS.

Outfitters to Plastics Mfrs. Since 1911

OMNI PRODUCTS CORP., Export Distributors, New York, N. Y.

Folding 6-ft. ruler, molded of polystyrene, is flexible, strong, easily cleaned. It will not warp, shrink, or stretch

Polystyrene Ruler

A PLASTIC folding ruler that will not noticeably warp, shrink, stretch, or absorb moisture under any climatic conditions is being manufactured of Lustrex polystyrene by Evans & Co., Newark, N. J.

This new 6-ft. polystyrene ruler is flexible enough to bend easily, yet it is so strong that, when fully opened, it can be formed into a complete circle, tip to tip, without breaking.

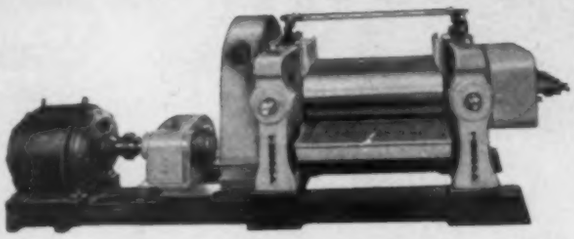
Numbers hot stamped

The 72-in. ruler weighs 5 ounces. It is injection molded in 12 pieces, which are assembled by the use of joints that are precision-engineered to a tolerance of 0.001 of an inch. The joints are made of hard-tempered steel, plated to resist rust and corrosion. The numbers and graduations are hot stamped in black on the white polystyrene before assembly. They have high visibility and long life. The ruler itself has a guaranteed accuracy to 1/64 in. over-all length.

The use of polystyrene for the ruler provides a material with high enough impact strength to assure non-breakage under normal working conditions. The ruler is also easy to clean — soap and warm water will wash away dirt or grease marks.

A similar polystyrene folding ruler is being molded and marketed by Master Plastics Molding Corp., St. Louis, Mo.

NEW Design Heavy Duty MILLS



...available with roller bearings

A COMPLETE new line of extra heavy duty individual motor driven 42", 50", 60", 72" and 84" mills for the rubber and plastics industry.

New features include reduced floor space; increased horsepower ratings where necessary; built-in herringbone gear speed reducers, mounted on anti-friction bearings; and our new design, internal expanding, shoe-type, hydraulically loaded safety brake —unquestionably the finest safety device available for mills at the present time. Send for specifications.

- *West Coast Rep.:* H. M. Royal, Inc., Los Angeles, Cal.
- *Export Agent:* Steinhardter & Nordlinger, 105 Hudson St., N. Y.

THROPP

WM. R. THROPP & SONS CO. Trenton, N. J.

MODELS and MOLDS

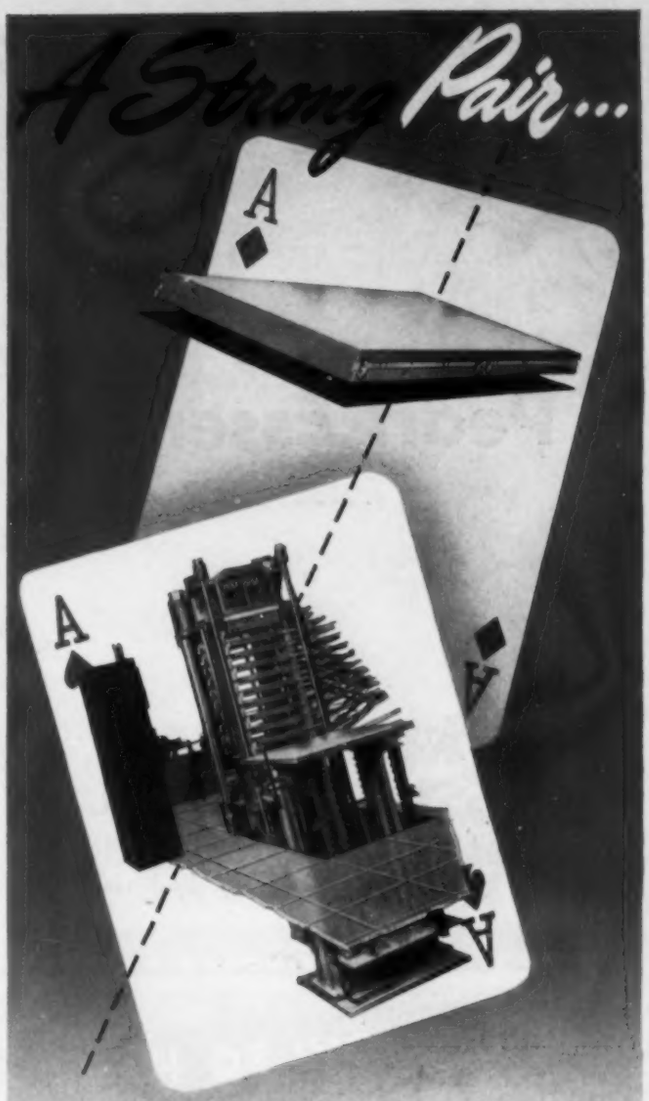
Eliminate costly changes in mold revisions by making 3-dimensional plastic models.

S. B. pre-mold testing models are precision made. They'll show you exactly how your final product looks.

From start to finish, S-B engineers translate your idea into a finished product, as they have—for over 25 years—for scores of firms with problems *just like yours.*

We specialize in:
INJECTION, COMPRESSION & TRANSFER MOLDS

STRICKER-BRUNHUBER CORP.
Mechanical Developers
19 WEST 24th ST. SB NEW YORK 10, N. Y.



for BETTER LAMINATION!

LAMINATORS everywhere agree that Wood presses and platens are aces high when it comes to turning out *better* laminations. They know that Wood automatic or semi-automatic multiple-platen presses make a winning bid for high-speed production bonding, and they win hands down when paired up with the precision-built Wood heating platens. Loading and unloading is efficient. Control of heating, cooling, and pressures is simple and precise, and the curing and finish of the laminated surfaces just right.

Get *better* laminations in *your* plant by using this winning pair! The R. D. Wood Company welcomes your inquiries.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE
ACCUMULATORS · ALLEVIATORS · INTENSIFIERS

Est. 1803 **R. D. Wood Company**
PUBLIC LEDGER BUILDING PHILADELPHIA 5

Pearl Essence

THE MEARL CORPORATION
153 Waverly Place New York, N. Y.

HOW TO HAVE PERFECTLY MOLDED PIECES Always

You always get perfectly molded pieces from TRU-CAST by Manco, because BOTH the cores and the cavities are made from the same parent hob—through our technique of CASTING beryllium from beryllium. You're always sure of positive register. Besides being precision-cast, the process is very economical. Would you like to see samples? Let us quote on your next blueprints.

Write, wire or phone for our brochure giving complete details.

BERYLLIUM COPPER AT ITS BEST
TRU-CAST by MANCO
MANCO PRODUCTS CO.
2401-2409 Schaefer Road
Melvindale • Michigan

Shown at left is washable polystyrene Teether Rattle Top. At right is polystyrene Roll Back with transparent case

Nursery Toys

TWO bright, colorful plastic toys now on the market are the polystyrene Roll Back and the Teether Rattle Top manufactured by H and W Products Co., Vancouver, Wash. The Roll Back (illustrated above, right) is a new wrinkle in an old toy. There have been many roll backs in the toy field, but this is the first to make use of a safe, transparent case that permits the child to look into the toy. The plastic Roll Back is injection molded in two halves. The top half is transparent polystyrene, the bottom half is brightly colored polystyrene. In the center of the Roll Back is a two-sided metal figure of a bear, supported by twisted rubber bands that have two metal rattles attached to them. The other ends of the rubber bands are looped around ribs that run the length of the sides and which interlock in the middle.

When assembling the Roll Back toy, there are pins that engage each other in each of the corners of Roll Back's half shells. A cementing agent provides the bond. When the toy is rolled forward, the rubber bands wind up; as the toy reaches the end of its roll, the bands begin to unwind and the inertia of the bear's weight causes the toy to roll steadily backward.

Teether is washable

The Teether Rattle Top is just what the name implies. The toy is molded of polystyrene in two halves. One half is bright red, the other half is yellow. The toy, which is washable, has a ring around it, the cross section of which is small enough for a child to get his mouth on, but the over-all diameter of which is too large for a child to swallow. The toy has rattles in it and can be spun like a top.

- ELECTRICAL
- AUTOMOTIVE
- SURGICAL
- SCIENTIFIC

INDUSTRIES

Let us show you the way to new products molded from nylon. Sample or blueprint requested for estimate.

HAUSER PRODUCTS, INC.

Manufacturers of Plastic Products
4034 NORTH KOLMAR AVENUE
CHICAGO 41, ILLINOIS
Phone PEnsacola 6-7670

Stamp Names or Trademarks

ON YOUR PLASTIC PRODUCTS

with the easy-to-use *Kingsley*

Up to 1,000 stampings per hour.

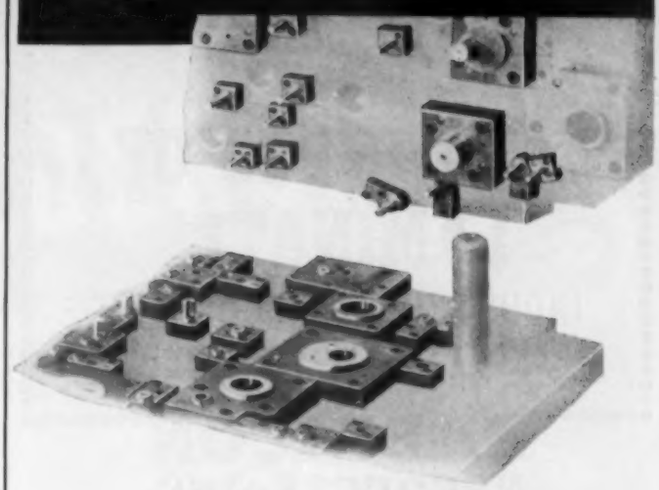
No skilled operators necessary.

Uniform, clean-cut stampings in gold or colors.

Write us about your marking requirements. Enclose a sample or dimensions of part to be stamped. We'll reply air mail with complete details on how a Kingsley Machine can be applied to *your specific need.*

Kingsley STAMPING MACHINE CO.
1606 CAHUENGA BLVD., HOLLYWOOD 28, CALIF.

It's only part of a **DISCARDED DIE** *but . . . .*



LOOK WHAT CAN BE SALVAGED!

. . . a cost-cutting feature of R-B Interchangeable Punches and Dies

Because R-B interchangeable punches, dies and their retainers are standardized . . . completely uniform and interchangeable . . . they can be used over and over as die requirements change. Retainers are quickly and easily re-located and mounted on new die shoes. Punches and dies, when worn, can be reground into new sizes and shapes. While this saving is important, don't forget that, besides saving time and money in *die-making*, R-B punches and dies also save money in reduced press "down-time" for punch and die *replacement* because they are completely and quickly interchangeable.

GET THE **WHOLE STORY** In This FREE Catalog

A 48 page book containing full information on Allied's "one stop service." Write for your copy.

Immediate delivery on R-B punches and dies of standard sizes, shapes and materials. Special punches and dies made promptly to your specifications.

ALLIED PRODUCTS CORPORATION

Department 29 • 4622 Lawton Ave. • Detroit 8, Michigan

Use

PHENOPREG

RESIN IMPREGNATED PAPER AND FABRICS

For

ALL TYPES OF LAMINATES

INDUSTRIAL • DECORATIVE
SPECIALTY • MOLDED

FABRICON
PRODUCTS, INC.
PLASTICS DIVISION
1721 PLEASANT AVENUE • RIVER ROUGE 18, MICH.
VInewood 1-8200

REPRESENTATIVES:
CANADA—Plastic Supply Co.
Offices in Toronto and Montreal
WEST COAST—Zellerbach Paper Co.
Divisions in Principal Cities of the West

Buttondex

AUTOMATIC BUTTON FINISHER!

saves time!
saves space!
cuts costs!

This compact automatic machine punches fins and cleans holes of Urea, Phenol and Melamine buttons.

- CAN BE SET AND RESET TO HANDLE ALL SIZES
- PRODUCTION UP TO 450 PER MINUTE
- COMES IN 3 SIZES
  MODEL S ACCEPTS SIZES 12 to 24
  MODEL SP ACCEPTS SIZES 36 to 50
  MODEL SX ACCEPTS SIZES 12 to 50

WRITE TODAY for full details!

ButtOndeX CORP.

"Your Problem is Our Product" - 386 Fourth Ave., New York, N.Y.

Technical Session

(Continued from page 75)

surface does more, perhaps, for soft wood plywood with its typical grainy, porous texture than it does for a hardwood plywood which in many cases may offer a dense, beautiful veneer configuration. A properly processed plastic surfaced Douglas fir plywood panel will not surface check and the tendency of the panel to grain raise under exposure to varying atmospheric conditions is greatly reduced

The type of surface finish obtained with a given grade of high resin phenolic impregnated papers for the most part is determined by the finish of the sheet metal caul against which the material is cured. While it is entirely possible to produce surfaces ranging from mirror finish through satin finish to dull matte finishes, the plywood industry has wisely avoided any effort to produce a truly decorative panel in their plywood presses.

Lest those of us in the plastic laminating industry look down upon the plywood industry as "poor relations," it might be well to point out that the production of the soft wood plywood industry alone dwarfs that of the plastic laminating industry. It is estimated that about two billion square feet of soft wood plywood (on a ⅜-in. thick basis) will have been produced in 1948. It is probably safe to say that well over one-half of this production consists of hot pressed grades. Whether measured in terms of the number of square feet of production or the number of square feet of hot press platen area, the plywood industry constitutes a large potential market for synthetic resin products.

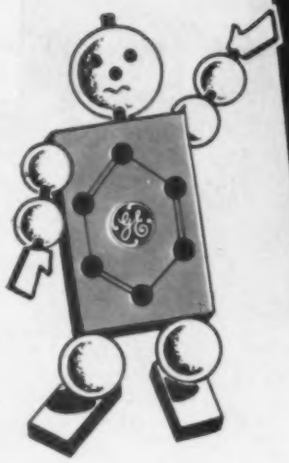
MOLDED FINISHES ON REINFORCED PLASTICS

by Clare E. Bacon, Owens-Corning Fiberglas Corp. and C. D. Jones, Structurlite Plastics Corp. (Delivered by Mr. Jones)

TO DATE most of the products that have been produced by the members of this Reinforced Plastics Div. have had such poor surfaces that they could be sold only to engineers who generally accept products on a basis of performance and don't care much about their appearance. To appreciably expand our industry we will have to produce parts that have a finish good enough to be sold to the average housewife who buys things across the counter because they look pretty and not because they have a Poisson's ratio of 0.29 or a dielectric constant of 3.5.

Overlay sheets may be used for decorative purposes or to improve surface smoothness. They may be fully saturated with resin or may be dry. Printed paper, mats, or fabrics can be used to give desired patterns or fine textured mats or paper may be used to hold a film of pigmented resin on the surface of a laminate and thus hide the texture of the base reinforcing material which would otherwise show.

A method which has been used at least experimentally to make formed parts having a glass smooth surface uniform in color and having no reinforcing fiber showing through the colored film involves spraying a pigmented polyester resin on the hot mold surface. This resin film gells almost immediately, then the reinforcing material and the laminating resin are placed in the mold and cured in the conventional manner. During the cure of the laminate the gelled film becomes tightly adhered to the laminate and appears and acts as an integral part of it. *(Turn to page 154)*



ATTENTION MOLDERS!

Here's how G.E.'s new low-cost General-Purpose Molding Compound can cut material costs

COMPARE THESE PROPERTIES

PROPERTY	Regular G-E General-Purpose	New G-E General-Purpose
Powder Properties		
Apparent density, grams/100cc	54 min.	57 min.
Powder pourability, sec./100cc	21 max.	23 max.
Bulk factor of powder	3	3.5
Flow range	Medium-soft	Soft
Properties of Molded Test Specimens		
Izod impact, ft. lbs. energy to break	0.18	0.17
Flexural strength, lbs./sq. inch	10,000	9,000
Tensile strength, lbs./sq. inch	7,500	6,000
Specific gravity	1.38	1.38
Water absorption, % 48 hours	0.8	0.6
Shrinkage, mils./inch	6	7
Heat distortion, C	145	145
Dielectric strength, 60 cycles, 25 C, inst., V.P.M.	375	280
Power factor, 60 cycles—dry	0.191	0.45
Dielectric constant, 60 cycles—dry	9.0	10.0

Interested in cutting costs? General Electric's new General-Purpose Compound is now available to you at a price *below* that of other general-purpose molding materials. *And this saving can be made while you continue to produce high-quality molded parts.* A glance at the property table at the left tells you why.

These new wood-flour-filled materials are available at present in four grades—two black and two brown. One grade of each color is designed for compression molding; the other two for transfer molding.

Why not let this latest product of G-E research help you cut costs? Write for data sheets and free samples today. Section 38-3, Chemical Department, General Electric Company, Pittsfield, Massachusetts.

YOU CAN PUT YOUR CONFIDENCE IN

GENERAL ELECTRIC

CD49-S9

ARE YOU BEHIND THE EIGHTBALL

Do you suffer from nausea in the morning, recurring headaches, pains in your lower back and chronic stoppage due to an inadequate source of supply for injection molded plastics parts?

If these are your symptoms there's nothing wrong with you that our famous STANDARD treatment won't set right in a jiffy.

Seriously though, STANDARD'S unified responsibility system will give you delivery as promised on precision molded plastics from tiny threaded pieces to huge thirty-six ounce units, such as door panels and complete radio cabinets.

STANDARD'S service is complete from engineering to finished product, if you wish. No divided responsibility to confuse the issue. Over a decade of experience and one of the best equipped plants in the country can make you forget your headaches in a hurry. Give us a chance to prove it.

No job is too large for our facilities or too small for our personal attention.

THE MARK OF A SUPERIOR PRODUCT

The Standard Products Co.

Executive Offices — 2130 West 110th St., Cleveland 2, Ohio
Sales Offices — 316 Fisher Building, Detroit 2, Michigan
Address inquiries to:
Plastics Division, 4668 Puttygut Rd., St. Clair, Michigan

TRAINING MEN *for The Plastics Industry*

Simply stated, that is the mission of Plastics Industries Technical Institute, department of West Coast University, College of Engineering. The entire program of the combined facilities of these two organizations is directed toward supplying the Plastics Industry with a source of well-trained, versatile engineering and technical personnel.

Training is offered on the following three levels:

1. The West Coast University nine-semester course in Mechanical Engineering with specialization in Plastics Processing, leading to the Degree of Bachelor of Science. This course may be completed in three calendar years.
2. The intensive Plastics Institute four-month course in Plastics Fabrication for resident students. Eight months of additional advanced training leads to the Certificate of Plastics Technician.
3. The Plastics Institute Home Study course for up-grading plastics industry personnel, or as preparation for worth-while employment in the industry.

All Courses approved for Veterans and Non-Veterans

The continued cooperation of the Plastics Industry is invited and appreciated.

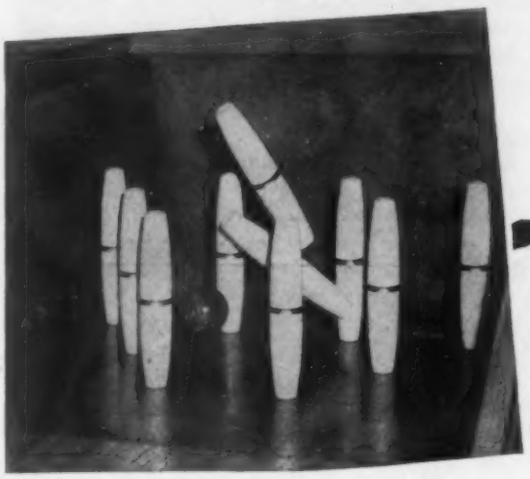
PLASTICS INDUSTRIES TECHNICAL INSTITUTE

Department of West Coast University

1609 S. WESTERN AVENUE
LOS ANGELES 6, CALIFORNIA

"PLASTICS are *Right* if they're Molded by *Northern*"

The Durable Bowling Pin Corporation decided to be the first to dress up wood pins in tough plastic. To do a job that had never been done before they selected Northern. They knew that Northern had not only the facilities, but the designing, engineering and molding experience that is so essential for just such pioneering jobs.



Northern experts are familiar with *all* compounds, know *how* and *when* to use them, and the best way to mold *each* one, Northern made good its promise to add good looks and longer life to bowling pins. Ethyl cellulose was the material used. What is *your plastic* problem?

Northern INDUSTRIAL CHEMICAL CO.

40 Years of Plastic Molding Experience

11 ELKINS STREET, SO. BOSTON, MASS. SOuth 8-4240

BRANCH OFFICES

441 Lexington Ave.
New York, N. Y.
Tel. VAnderbilt 6-1684

627 Powers Bldg.
Rochester 4, N. Y.
Tel. BAker 8701

P. O. Box 5604
Phila. 29, Pa.
Tel. Victor 4-8679

POLYETHYLENE VINYLS

AND OTHER PLASTIC MATERIALS

We have capacity to mix, and granulate these materials to customer's formulations. Work is done in new plant, in new Banburys and on new mills. Your inquiries are invited.

MARBON CORP.

1926 WEST 10th AVE.
GARY, INDIANA

COTTON FABRICS

FOR REINFORCING

PLASTICS

★

J.H. LANE & CO., Inc.

250 W. 57th St. • New York, N. Y.

THE CARVER LABORATORY PRESS

Write for latest catalog, describing Carver Laboratory Press & Standard Accessories.

FRED S. CARVER INC.
HYDRAULIC EQUIPMENT
343 HUDSON ST. NEW YORK 14, N. Y.

RECTO
Injection • Compression • Transfer Molding

Since 1920

★

R

MOLDS MADE IN OUR OWN PLANT

RECTO MOLDED PRODUCTS, INC.

Custom Molders of Plastics Since 1920

CINCINNATI 9, OHIO ME Irose 6862
DETROIT OFFICE: L. S. HOUSE
3-167 GENERAL MOTORS BLDG. MADISON 5781

SURFACE COATINGS FOR REINFORCED PLASTICS

by Paul O. Blackmore, Interchemical Corp.

WHERE a reinforced plastic is to be used as a wall partition, a refrigerator inner door liner, a radio cabinet, or a host of other articles of commerce where reinforced plastics are supplanting metal, a surface coating offers the simplest, most economical, and most headache-free method of providing the necessary sales appeal. It offers the laminator or molder the opportunity to use any color; it provides him with even greater facilities for the production of patterns; it enables him to produce pure, clean whites or light tints of high brightness.

It is possible to obtain tough, flexible, tightly adherent coatings on reinforced plastics by conventional methods; finishes applied after the molding or laminating operation have the advantage of being able to hide surface defects that may have occurred during previous processing.

For plastic refrigerator inner door liners, where freedom from residual odor is important, systems based on vinyl resins are available. The vinyl enamels are baked for 25 or 30 min. at 300° F. The vinyl systems have the same general resistance properties as the urea-alkyds, and have the additional advantage of imparting no odor or taste to foods. However, because they spray at lower solids, their cost per square foot is higher.

The finishing of low pressure laminates or moldings based on polyester resins has also been satisfactorily accomplished. Here, in addition to the problem of adhesion, there is one of building up a satisfactorily smooth surface, particularly where coarse fabrics or fibers are used as the reinforcing material. In such cases it may be necessary to resort to a sanding surfacer or even a knifing putty to fill up the pores and surface irregularities before the final finishing coats can be applied.

BASIC CHEMISTRY OF THE POLYESTER LAMINATING RESINS

by E. M. Beavers, The Resinous Products Div., Rohm & Haas Co.

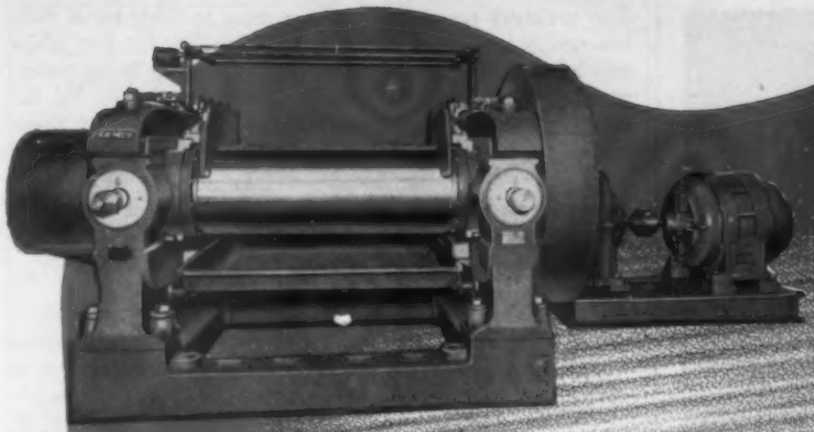
THE polyester laminating resins are solutions of unsaturated polyesters in polymerizable monomers. The polyester and monomer are capable of co-reaction by addition polymerization, to yield strong, thermoset products without the evolution of any by-products.

Addition polymerization is that which occurs without the formation of water, ammonia, formaldehyde, or any other such low-molecular-weight by-product of the reaction. In most cases of addition polymerization, many molecules of unsaturated monomer unite to form long-chain polymers in which the double bonds have disappeared and new single bonds are formed. The only by-product of this reaction is energy, which appears as heat.

The copolymerization of the monomer and polyester will occur after a relatively long period of time at room temperature. It can be accelerated by heating, and hastened still further by the use of peroxide catalysts. Auxiliary catalysts, such as mercaptans, amines, or heavy metal salts, have been found to permit a degree of curing even at ordinary room-temperature.

Having a precise knowledge of the properties contributed by the various monomers, and of how to "tailor" polyesters which will contribute other desired features, the chemist is in a good position to design resins to meet the requirements of specific applications.

(*Please turn to page* 156)



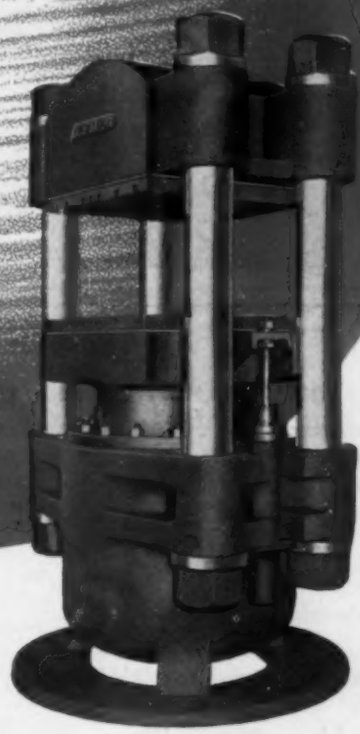
Heavy-duty Mills, in all sizes up to 84 inches, featuring extra heavy construction, smooth operation, and long life.

Laboratory Mills furnished with built-in motor, control and adjustable speed drive. Entirely enclosed ready to operate. Mechanism is readily accessible.

QUICK PROFITS with EEMCO'S QUICKER DELIVERY

42—ton Laboratory Presses, entirely self-contained, equipped with 12"x12" platens, occupying floor space of only 14"x 26". Has adjustable opening.

Presses for compression, transfer molding, laminating, and polishing. All sizes and types. Custom built.



TO INCREASE PRODUCTION — and therefore profits — you should choose EEMCO. Here is a line made in a factory with more than 30 years experience in Rubber and Plastic machinery. EEMCO operates its own modern foundry and machine shop, and has every facility including a large stock of motors, controls, and necessary component parts to insure quick delivery. Choose EEMCO for correct design and sturdy dependability. Built for heavy duty and long life, EEMCO saves time and money. Currently, EEMCO is making exceptionally fast deliveries. Write today for quotations.

- MILLS
- PRESSES
- CRACKERS
- WASHERS
- CALENDERS
- REFINERS

EEMCO — ERIE ENGINE & MFG. CO.

953 EAST 12th ST., ERIE, PENNA.

RUBBER AND PLASTICS MACHINERY DIVISION

Custom
INJECTION
MOLDERS
WE SPECIALIZE IN
SHORT RUNS
- OUR OWN DIE SHOP
- LOW DIE COST
- SPEEDY DELIVERY
- EXPERT FINISHING
- IMMEDIATE ESTIMATES

OUR ENGINEERING STAFF WILL GLADLY HELP SOLVE YOUR PROBLEMS

PAUL GOUGELMAN COMPANY
30 North Michigan Avenue
Chicago 2, Illinois

MAYFLOWER H.F.
DIELECTRIC HEATING EQUIPMENT
Generators of 500-1000-2500-5000 watts and 15 kilowatts at frequencies best suited to furnishing a basic source of radio frequency heat for average applications.

ELECTRONIC
BAR SEALER
Manufactured under RCA patents

For fast, straight sealing of thermoplastic films and sheetings. Designed and built to fill your individual requirements.

Also ELECTRONIC SEWING MACHINES with single or dual wheel applications.

Our engineers make a complete analysis of every application where electronic heat is required in a plant and fit the equipment to "overall" requirements and not to a single job.
SUBMIT YOUR PROBLEMS FOR SPECIFIC RECOMMENDATIONS
Mayflower Electronic Devices, Inc.
A DIVISION OF MAYFLOWER MACHINE AND TOOL CO.
6014 Hudson Boulevard West New York, N. J.
Union 3-7100

The greatest problem in this young and vigorous field has not been one of acquiring versatility, for few plastics have the inherent versatility of these. The greatest problem has, instead, been to determine which of the many possible applications will be best served by these resins and most deserving of special synthetic design.

SILICONES — NEW ENGINEERING MATERIALS

by R. W. Kolderman, Dow Corning Corp.

SILASTIC is our trade name for silicone rubber. It bounces and stretches like rubber but unlike rubber it does not soften on heating nor stiffen on cooling to very low temperatures. Recent stocks have brittle points as low as −180° F. and are usable as high as 350° F. continuously or 500° F. intermittently. Molding is normally done at 250° F ± 10° at a pressure of about 400 p.s.i. In extrusion of Silastic, enough heat is generated to make it unnecessary to heat the die.

Laminates of Silastic having a maximum ratio of one part of Silastic to one part glass are normally made by molding multiple layers of glass cloth coated with Silastic paste stock. For higher ratios of Silastic to glass cloth, alternate layers of Silastic paste coated glass cloth and sheeted Silastic stock are used. Asbestos cloth and metal fabrics can also be used in making laminates.

Silastic applications are numerous and a few typical applications are oil seals; gaskets for heat, vacuum, chemicals, oil or combinations thereof; wire coverings; high temperature caulking; conveyor belting; and slip sheeting because of non adhesion of most materials to Silastic. DC 2103 resin is being used as a bonding resin in commercially available glass cloth laminates and silicone molding powders are emerging from the laboratory. Recently a high impact silicone molding compound has been prepared containing chopped glass fibers and inert filler.

ORGANIC PEROXIDES AS CATALYSTS FOR POLYESTER TYPE RESINS

by C. H. Rybolt, sales manager, Lucidol Div., and T. C. Swigert, Technical Service Dept., Lucidol Div., Novadel-Agene Corp.

BENZOYL peroxide, in spite of its general usefulness, does not fulfill the catalyst requirements for all of the varied applications of polyester resins. Resin manufacturers have sought to improve color, impact strength, resistance to water absorption, electrical properties, storage characteristics, and curing properties of their resins. In order to gain full advantage of these improvements, it may be necessary to re-evaluate peroxide requirements. Considerable interest has been shown in room or slightly elevated temperature cures of polyester resins. Benzoyl peroxide alone is not suitable for this application, but promoters are available which, when used with benzoyl peroxide, make room temperature cures possible. However, many fabricators feel that this additional variable should not be added if the same results can be obtained by the use of the proper resin and catalyst combination.

The development of improved resins, and the diversified requirements of the fabricator, have made it necessary for the catalyst supplier to have available a wide variety of products from which to choose. Selection of the proper resin-catalyst combination will enable the fabricator to develop balanced properties in the finished product using an established curing cycle at specified time and temperatures.

Hand Toggle Press

FOR BENCH WORK

This hand toggle press is excellent for light drawing, forming and cementing. The stroke is easily adjusted for many types of work.

Other B & D Equipment
2 Types Saws
Swedging Presses
Meshed Cutters
Automatic cut-off machines

Send For Bulletin on B & D Family of Plastic Accessories.

BARKER & DAVIS MACHINE CO., INC.
91 MECHANIC STREET • LEOMINSTER, MASS.

DIEMOLDING CORPORATION
Canastota, N. Y.

TRADE DM MARK

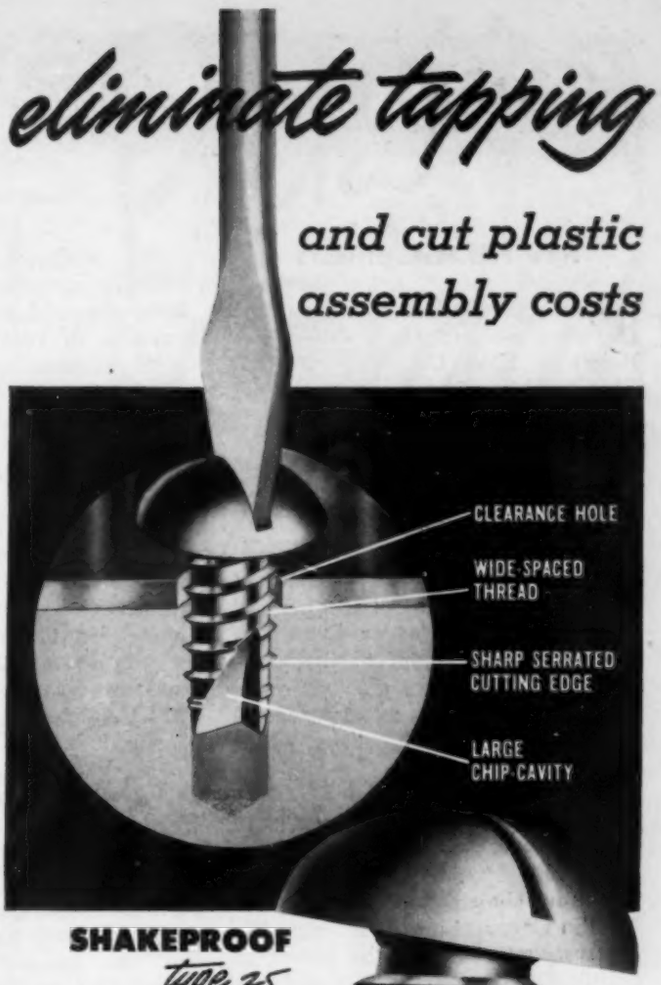
A complete molding plant for thermosettings with an enviable record of performance established with many of the largest users of molded parts.

Call upon our engineers and designers for aid or advice in planning your molded parts.

Plastic Molders Since 1920

DIEMOLDING CORPORATION

eliminate tapping and cut plastic assembly costs



SHAKEPROOF *type 25* **THREAD-CUTTING SCREWS**

Now you can tap and fasten in just *one* money-saving operation with Shakeproof Type 25 Thread-Cutting Screws! Specially designed acute serrated cutting edge actually cuts its own perfect mating thread in soft or brittle materials. Its wide-spaced thread resists stripping and the large chip cavity provides ample clearance for deflecting chips ahead of the screw. These free-cutting screws completely eliminate separate tapping operations and in many cases make unnecessary the use of costly threaded inserts.

WRITE FOR FREE TESTING SAMPLES

Prove to yourself the advantages of Shakeproof Thread-Cutting Screws! Write for free Kit No. 10 which contains liberal samples of the spaced-thread Type 25 and its companion standard-thread Type 23 Screws. Do it today!

Shakeproof inc.
DIVISION OF ILLINOIS TOOL WORKS

"Fastening Headquarters" TRADE MARK

2501 NORTH KEELER AVENUE, CHICAGO 39, ILLINOIS
In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario

THE PLASTISCOPE*

INTERPRETATIONS OF THE CURRENT NEWS

By R. L. VAN BOSKIRK

New P.M.M.A. officers

DR. FREDERICK

DR. D. S. Frederick, vice-president of Rohm & Haas Co., Philadelphia, Pa., was elected president of the Plastic Materials Manufacturers Association at its annual meeting in January. Felix N. Williams, vice-president of Monsanto Chemical Co. and general manager of its Plastics Div., was elected vice-president of the association. Officers re-elected were F. H. Carman, secretary-general manager, and John E. Walker, treasurer.

Newly elected members of the P.M.M.A. board of directors are J. R. Hoover, vice-president of B. F. Goodrich Chemical Co., and Alan N. Mann, chairman of the board of Catalin Corporation of America. Directors continuing on the board, in addition to Dr. Frederick and Mr. Williams, are D. M. Rugg, vice-president, Koppers Co., Inc.; W. W. Knight, Jr., general manager, Plaskon Div., Libbey-Owens-Ford Glass Co.; and S. E. Palmer, assistant vice-president, Tennessee Eastman Corp. Arnold E. Pitcher, E. I. du Pont de Nemours & Co., Inc.; J. L. Rodgers, Jr., American Cyanamid Co.; and W. S. Landes, Celanese Corporation of America, former presidents of the association, were named to serve on the board of directors in an advisory capacity.

The Resin Adhesives Div. of the association elected as its chairman P. A. Macy, chief chemist, Perkins Glue Co., Lansdale, Pa.

Dr. Frederick joined Rohm & Haas as a research chemist in 1934. Two years later he was assigned the responsibility of organizing a plastics sales department and directing technical sales development work on acrylic products. In 1943 he was elected a vice-president. He is a member of the board of directors and of the executive committee of the company. He has served as a director and vice-president of P.M.M.A. for the past two years, having been chairman of its technical committee since 1945.

Mr. Williams was employed in 1923 by the Swann Chemical Co., later acquired by Monsanto Chemical Co. In 1944 he was appointed vice-president and general manager of the Plastics Div. in Springfield, Mass. He was elected a director of the company in May, 1947.

A feature of the annual P.M.M.A. meeting was the showing by Professor A. G. H. Dietz of the Massachusetts Institute of Technology of a motion picture in color. The film depicts the operation of a new machine for testing plastic materials which is the outgrowth of research sponsored by the association at M.I.T., a research project now entering its fourth year.

S.P.E. officers named

M. PETRETTI

NATIONAL officers of the Society of Plastics Engineers for 1949 were named at the January 20 session of the annual meeting of the Society. They are: president, Mario Petretti, general manager, Plastics Div., Noma Electric Corp., Holyoke, Mass.; vice-president, William J. Dunnican, The Borden Co. Chemical Dept., Philadelphia, Pa.; secretary, M. Scott Moulton, The B. F. Goodrich Chemical Co., Cleveland, Ohio; treasurer, E. Todd Clark, Burkhart Mfg. Co., St. Louis, Mo.

Prize winners in the second Prize Paper Contest of the Society were also announced as follows:

First Prize, $200, to A. R. Morse, service engineer, Reed-Prentice Corp., writing on "Empirical Factors in Injection Machine Design."

Second Prize, $100, to Ronald D. Beck, development engineer, Continental Can Co., Plastics Div., for his paper "Hot Air Preheating of Compression Molding Powder. A Method and an Apparatus."

Third Prize of $50 was divided between Irving Silver, Naval Ordnance Laboratories, Washington, D. C., and Warren J. Prince, consulting engineer, Los Angeles, Calif. Mr. Silver's paper was on "Shear Impact and Shear Tensile Properties of Adhesives." Mr. Prince's subject was: "Basic Laws of the Plastic Molding Process."

Government awards chemical company stock

TWO blocks of Rohm & Haas stock were recently awarded to two investment banking groups for resale to the public. The award was made by the Office of the Alien Property Custodian and represents stock which came from the estate of Dr. Otto Rohm of Darmstadt, Germany, one of the company's founders. It had been seized by the Department of Justice under the Trading with the Enemy Act. The relationship between the German and the American companies was terminated by World War II. The patent contracts between them were cancelled by a consent judgment, and at the present time there are no contracts between the two companies.

Award of 15,815 shares of 4% cumulative preferred stock was made to A. G. Becker & Co., Union Securities Corp., and Ladenburg, Thalmann & Co., on a bid of $98.59 per share of stock.

A group consisting of Kidder, Peabody & Co., and Drexel & Co., was awarded 197,697 shares of common stock on a bid of $38.5431 per share. The preferred stock will be offered to the public priced at 100 plus accrued dividends.

The attorney general still holds 5410 shares of the company's preferred stock and 67,627 shares of common stock. Rohm & Haas has agreed that if this additional stock is not publicly offered for sale within about six months, the extra shares will be deregistered.

The prospectus containing the registration statement for Rohm & Haas points out that company net sales have increased from around $10,000,000 in 1938 to $53,000,000 in 1947 and $47,000,000 in the first 9 months of 1948. The 1947 volume was higher than any other year except 1944 when huge quantities of Plexiglas were going into war planes, and even in that year sales were only about $700,000 more. A percentage of sales by departments in 1947 shows 23% for plastics; 38% for resinous products; 10% for leather; 10% for textile; 7% for

*Reg. U. S. Patent Office.

ORGANIC PEROXIDES

TERTIARY BUTYL HYDROPEROXIDE
TERTIARY BUTYL PERBENZOATE
DI-TERTIARY BUTYL DIPERPHTHALATE
TERTIARY BUTYL PERMALEIC ACID
TERTIARY BUTYL PERPHTHALIC ACID
1-HYDROXYCYCLOHEXYL HYDROPEROXIDE-1

Now available in addition to:

LUCIDOL* (BENZOYL PEROXIDE)
LUPERCO* (PEROXIDE COMPOUNDS)
ALPEROX* C (TECHNICAL LAUROYL PEROXIDE)
LUPEROX* (PEROXIDE PASTES)
LUPERSOL* (PEROXIDE SOLUTIONS)
SPECIAL ORGANIC PEROXIDES

*REGISTERED TRADEMARK

TRADE MARK

LUCIDOL DIVISION
NOVADEL-AGENE CORPORATION
BUFFALO 5, NEW YORK

. . . to quote or counsel on molded plastics

Your Watertown man is an expert in plastics, backed by 34 years of experience with every type of plastic, every type of molding method. Calling him in to quote or consult on any part, product *or idea* involving molded plastic won't cost you a cent . . . will give you the benefit of our design and engineering skill, as well as our laboratory—second to none in the industry—in developing and producing the job to your satisfaction and your customers'.

If you have a custom molded plastics job on the fire, phone your nearest Watertown man today . . . or phone or write us directly. Here are the Watertown men . . .

NEW YORK—H. A. Rankow, 175 Fifth Ave.
CHICAGO—National Insulations Company 2808 W. Lake St.
E. W. Glaescher, R. C. Farquhar, J. P. Bonnamy, J. R. Kallaher, J. P. Greener
DETROIT—J. P. Greener from Chicago
CLEVELAND—Carl F. Linn, 866 Hanna Bldg.
MILWAUKEE—Roger L. Miller, 729 N. Bdwy.
SEATTLE—John W. Witherow, National Vulcanized Fibre Co. 1927 First Ave., South
SAN FRANCISCO—G. W. Harmsson, National Vulcanized Fibre Co., 273 Seventh Ave.
LOS ANGELES—Fred M. Foley, National Vulcanized Fibre Co. 2325 East Eighth St.

THE WATERTOWN MANUFACTURING COMPANY
1000 ECHO LAKE ROAD, WATERTOWN, CONN.

Plastics Scrap!

★ BOUGHT
★ SOLD
★ REWORKED

Custom Milling, Grinding, Coloring

CELLULOSE ACETATE
• BUTYRATE •
POLYSTYRENE
METHYL METHACRYLATE
POLYVINYL RESINS
• NYLON •

A. BAMBERGER
CORPORATION
44 Hewes Street, Brooklyn 11, N. Y.
Phone: ULster 5-3887
CABLE: CHEMPROD BROOKLYN

THE PLASTISCOPE

agriculture and sanitary chemicals: 12% for general. The percentage of resinous sales has been climbing since 1944.

More metallic vinyl

ANOTHER metallic colored vinyl film has been introduced, this time a cast 2-mil film by the Reynolds Metals Co., 19 E. 47th St., New York 17, N. Y. The company asserts that it is possible to obtain an exceptionally lustrous and brilliant finish by its casting process.

The new material is marketed at 93¢ per lb. in carload lots of 50-lb. rolls of from 36 to 41 in. in width. Company spokesmen point out that there are 7.9 sq. yd. of material per lb. of a 2-mil film, compared with 4 sq. yd. of a 4-mil film.

The company asserts that it uses a different type aluminum pigment than is used in calendered film. A leafing type of pigment is the conventional form used on most vinyl film, as well as in other types of aluminum inks or paint, but the new Reynolds film is treated with a non-leafing type aluminum pigment.

Resin modified film—Reynolds Metals has also announced a reduction of 2¢ per lb. in its Reynolon T-3000 series, which is a 1½- to 2-mil cast transparent vinyl, resin modified, film, now ranging in price from $1.13 to $1.33 per pound. "Resin modified," means that a non-migrating, polymeric plasticizer is used. It is claimed that Department of Agriculture tests show an extractability of less than 0.1 of 1% for this film. It is recommended particularly for transparent packages used with soft goods, but the company has great hopes that it will soon find entré into the food industry.

Four phenolic compounds

NEW woodflour-filled phenolic molding compounds priced at an average of 1¢ per lb. below the market price of other general purpose molding powders have been announced by the General Electric Co., Chemical Dept., Pittsfield, Mass.

The four compounds—black and brown for compression and transfer molding—have a specific gravity of 1.37 and are said to have flow characteristics, cure time, and water resistance nearly equal to more costly woodflour-filled phenolics.

Although the new materials do not have a high gloss on long-draw moldings and may show a slightly less rigid discharge from the mold, tests by General Electric indicate that they are highly satisfactory for the majority of thermosetting plastics applications.

Dispersed colorants

A SERIES of dispersed colorants especially prepared for use with vinyls is being offered by Schiefer-Eldridge Printing Ink Corp., 110 York St., Brooklyn 1, N. Y.

This company has developed a technique for using monomeric plasticizers such as dioctyl phthalate as a dispersing medium for vinyl colorants. The company claims to have successfully blended many of the less readily dispersed materials but is particularly proud of its carbon black dispersion at concentrations equivalent to that of master batches but still possessing softness and flow properties which make them clean and easy to handle in the plant.

The company points out that plastic pigment dispersions are different from pigment-resin master batches in that they offer higher pigment concentration in more finely dispersed systems and make color matching easier. They are prepared on special three-roll grinding mills rather than the commonly used colloid mills which may overheat and destroy the value of the pigment during grinding.

Other advantages of plastic pigment dispersions suggested by the manufacturer are: ease of incorporation of the dispersion into the vinyl compound; no dusting of dry pigment from one mill to another and general reduction in contamination; reduction of mixing time and compound cost; uniformity—no specks of pigment in translucent compounds; reduction of health hazard by elimination of dusting pigments in the air; easy matching of colors by simple yet thorough mixing of various dispersed colors.

For calendering operations, the dispersions are most readily added in the preliminary hot mixing cycles. For extrusion the dispersions may be added in the same way or added to an extrusion compound prepared with a Banbury mixer. For dry mixing in the Hungerford Tumbler Process, a diluted plasticizer dispersion may be sprayed into the tumbler or incorporated simply by adding a weighed amount of dispersion to the resin in the tumbler. In organisols or plastisols the colorant dispersion may be added by simple mechanical stirring.

A new phenolic

A NEW general-purpose phenolic molding compound which incorporates certain flow characteristics demanded by the thermosetting molding industry is being marketed by Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y.

The new 14300 Black compound flows readily, but the time of flow is relatively short. Back pressure is thereby built up quickly in the mold. This property is particularly desirable where the mold escapements are looser than normal because of wear or other reasons. When used in flash or semi-positive molds that have been in production for a long time, Durez 14300 will provide sufficient back pressure to obtain satisfactory density and surface finish without excessive flash. With its excellent surface finish, Durez 14300 Black is well suited for large housings and radio cabinets, as well as for house wiring devices, and many other small parts. Physical property data and further information are available from the manufacturer.

Floor tile in 10 colors

A LUXURY flooring recently announced by Armstrong Cork Co., Lancaster, Pa., is made of a "chemically reacted combination of plastics" developed for the top-end of the floor covering market. Known as Corlon tile, it is available in 10 colors, is highly grease resistant, and possesses high resistance to indentation, according to the manufacturer.

It is made in four sizes—6 by 6 in., 9 by 9 in., 12 by 12 in., and 18 by 36 in.—all in ⅛ thickness.

Plastics in Holland

PRODUCTION of a new plastics material known as Methacrylatarsen by N. V. Chemische Industrie Magenta, Delft, Netherlands, was announced recently. The company also is reported to be planning to manufacture other plastics.

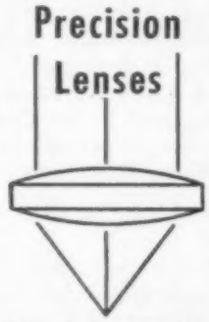
This may tie up with a report

Arnold BRILHART Ltd.

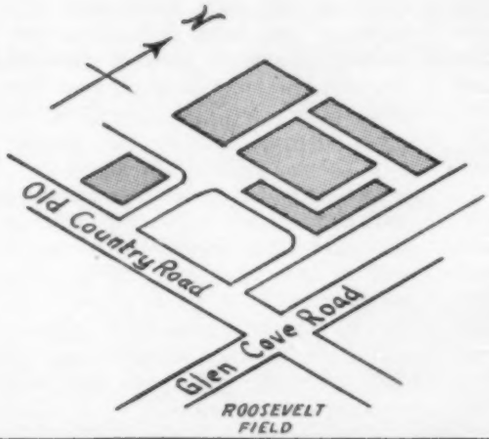
INJECTION
(Capacity Ranging 1 Oz. to 32 Oz.)
Compression
Transfer

Plastic Moldings

Thermoplastic Precision Lenses



Licensed under Kingston Patent 2314838



MINEOLA
LONG ISLAND
NEW YORK
GArden City 7-0425

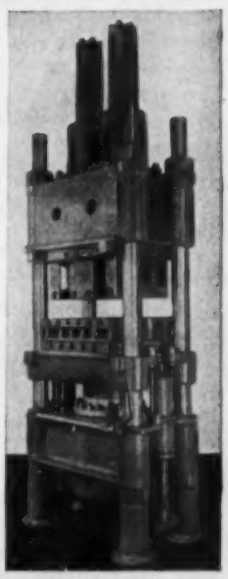
Then you'll want to investigate *Ferro's inorganic colors*—ideally suited for compression and injection molded plastics. Select from full color range. Colors stable (to 2300 degrees Fahrenheit) and highly chemical-resistant. Write for further details and samples.

Color Division

FERRO ENAMEL CORPORATION

4150 East 56 Street *Cleveland 5, Ohio*

TWO HEADS ARE BETTER THAN ONE



As this double ram transfer molding press has two sprues, the necessity of center gating single cavity molds is eliminated. This feature increases the possibilities for mold design where point of gating is important. It also means better and faster fills on pieces that have heavy sections covering large areas. If desired, only one ram may be used.

Several of these presses are in use at Hemco Plastics Division, Bryant Electric Co., Bridgeport, Conn.

We invite your inquiries.

Dunning & Boschert
PRESS CO., INC.
331 West Water Street Syracuse, New York

THE PLASTISCOPE

from the Netherlands a year and a half ago stating that a Dutch chemist had developed a low-cost material very similar to methyl methacrylate.

Phosphorescent lighting

SEVERAL hotels in New Jersey have recently been equipped with phosphorescent plastic exit signs such as arrows to help locate fire escapes, stairways, etc., quickly in an emergency and thus speed up evacuation. The signs are fabricated from polyester laminates or acrylic sheets in which phosphorescent pigment has been incorporated.

The advantage of these signs over those regularly used for such applications is that the phosphorescent pigment will continue to glow in the dark when the lights go out. The pigments used are zinc sulfides or calcium strontium sulfides, according to information furnished by the New Jersey Zinc Co.

The development of the use of phosphorescent pigments in plastics has been slower than expected, probably a result of the general economic situation whereby most firms sold everything they could produce without taking time to get new ideas. It is expected that phosphorescent pigments will show up considerably more in plastics during the next few years.

Phosphorescent polystyrene switch plates, housings for clocks and flashlights, and a number of other applications of molded phosphorescent material were described in detail in MODERN PLASTICS, October 1948, page 88.

Thermoplastic lamp shades impregnated with a phosphorescent pigment are expected to develop a volume market within a year or two.

The United States Merchant Marine—in fact, all transportation systems—are prospects for a vinyl coated tape with a phosphorescent pigment in the vinyl. This material was used successfully by the Navy during the late war.

Another possible use is identification of coal cars used in underground coal mines. Phosphorescent paint is being considered at present but probably will not stand up under the kind of treatment and weathering conditions existant in coal mines. An extruded phosphorescent plastic strip would be more durable. A plastic dial for clocks that has been treated with phosphorescent pigment is another idea.

The pigments may be used in polystyrene, acetate, and acrylic with great success but should be incorporated during polymerization in order to get good dispersion. Experience has been sufficiently extensive to date to indicate that the pigments may be incorporated into polyethylene molding compound by tumbling just before the molder puts the material in the press.

The phosphorescent pigments are probably easier to incorporate in polyesters than in any plastic resin and in this case are added while polymerization is taking place. Certain of the phosphorescent pigments can also be used in urea and in clear phenolic, but these give only a short after-glow.

Transparent billboards

A CORRESPONDENT sends us the following self-explanatory clipping from the Rocky Mount, N. C., Evening Telegram:

"We must get rid of unsightly billboards on our highways. Why not make them of transparent plastic so we can see the waiting cops?"

COMPANY NEWS

Joseph Davis Plastics Co., Arlington, N. J., has purchased from Landers, Frary, and Clark of New Britain, Conn., the special equipment and sole rights for the manufacture of nitrocellulose two-color inlay rods. The company will produce the same rods and shapes as did Landers, Frary, and Clark, as well as new designs and shapes.

Presto Plastic Products Co., Inc., 40 Worth St., New York, N. Y., has announced a variation in the currently popular metallic colored vinyl film. The new style gives a plaid effect over a solid metallic color and may be had in several variations.

The film sells for 22¢ per yd., for 36 in. widths, and 32¢ for 54 in. widths. This is in comparison to 17¼¢ for 36 in. solid metallic color.

E. I. du Pont de Nemours & Co., Inc., has reorganized and relocated the sales dept. of the Industrial Div. of its Plastics Dept. Sales are now being handled only through three main regional offices in New York, Chicago, and Los Angeles. District sales offices in Boston and Detroit are being maintained as subdivisions of the New York and Chicago regional offices.

Principal sales offices of the division, which were in Arlington, N. J., have been moved to Wilmington, Del. The technical service section remains in Arlington. Manufacturing operations at the plants are not affected by the shift.

Regional sales offices are in charge of E. H. Tyson at 7 S. Dearborn St., Chicago; W. J. Ambersley, 845 E. 60th St., Los Angeles; and M. M. Taylor for New York, with temporary offices at Arlington.

L. B. Gillie, director of sales, and E. J. Pechin and P. W. Crane, assistant directors, have offices in the Nemours Bldg., Wilmington.

B. F. Goodrich Chemical Co. has announced that R. P. Kenney, former international sales manager, has been appointed chemical sales manager, replacing S. L. Brous, who is leaving Goodrich to join the General Electric Co., Chemical Div., Pittsfield, Mass. J. C. Richards, former Hycar and rubber chemicals sales manager, replaces Kenney as manager of international sales. W. D. Parrish, former technical service manager for Hycar and rubber chemicals, is the new manager of that department.

Roger C. Bascom, senior sales representative for Hycar and rubber chemicals in the New England office, replaces Parrish in the Cleveland headquarters office. Roger E. Stetler, former sales service laboratory assistant, replaces Bascom as sales representative in New England.

The B. F. Goodrich Co., Akron, Ohio, has appointed E. F. Tomlinson, formerly general manager of Industrial Products Sales, as general manager of its newly created Industrial and General Products Div. The new division is a consolidation of the Plastics Products Sales and Production Depts. and the Industrial Products Sales Div. of the company. Clyde O. DeLong, formerly merchandise manager of Industrial Products Sales, has been named manager of the Plastics Products Sales Dept., which will be located at the company's plastic plant near Marietta, Ohio, where Koroseal is produced. L. H. Chenoweth will re-

NEW

STYRON 637

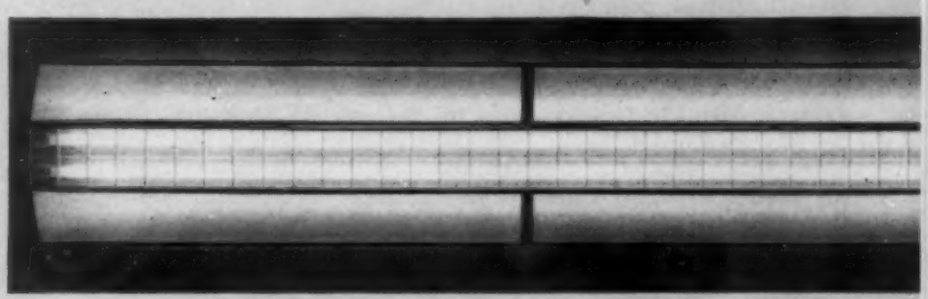
provides greater light stability

This new grade of Dow Polystyrene opens a vast number of new product applications. The increased light stability of Styron 637, in whites and crystals, makes it applicable to fluorescent light fixtures, lamp shades, optical and automotive interior parts. Its resistance to discoloration from light is several times that of previously available polystyrenes.

STYRON 637 used in Fluorescent Lighting Fixtures insures:

- GOOD LIGHT STABILITY
- LONGER COLOR LIFE
- BETTER LIGHT DIFFUSION

Luminaires by Allen & Olsen Manufacturing Co., Venice, California • Extruder: *Plastic Process Company, Inc., 662 North Robertson Blvd., Los Angeles 46, Calif.*



Styron 637 retains all the excellent properties of Styron, plus offering improved light stability. It is readily extruded and molded into diffusers and structural parts, and maintains its rigidity and dimensional stability in thin, large area sections. Combination of Styron 637 with metal provides attractive fixtures with a major reduction in weight. With Styron 637, extended color life can be added to your lighting specifications.

Contact your nearest Dow Sales Office today for information on how new Styron 637 can apply to your product.

PLASTICS DIVISION T-16 • THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

DOW Plastics

THE PLASTISCOPE

main in Akron on special assignments for the plastics department.

The Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, has announced the appointment of John Dolan as vice-president and general sales manager succeeding P. C. Pocock who has been made assistant to the president.

George A. Daniels is secretary and treasurer, succeeding W. C. Batchelor who has resigned after 33 years of service.

Philip J. Lindner, formerly chief engineer, has been named to head the firm's Detroit, Mich., branch sales office at 2842 W. Grand Blvd.

Chroma Dye Co., 4539 Lincoln Ave., Chicago 25, Ill., has introduced a new line of plastic dyes and cements. The dyes are fast action, cold dip, and of the solvent action type. Dyes are available for acrylic, acetate, nitrate, vinyl, polystyrene, and cellophane.

The Dow Chemical Co., Midland, Mich., has completed new facilities expanding its phenol capacity by 30,000,000 lb. per year.

Monsanto Chemical Co. has announced organizational changes as part of its program to strengthen its plastics research and speed progression of new products from the laboratory into actual production. Changes include the transfer of Dr. Earl C. Chapin from the Central Research Dept. in Dayton, Ohio, to the Plastics Div., Research Dept. at Springfield, Mass. C. H. Basdekis has been transferred from the Research Dept. in Springfield to Central Research at Dayton. A new Plastics Application Research group has been established at Dayton under the leadership of Robert E. Cairns of Springfield, who will be assisted by Eli A. Haddad. The two polymer research groups at Dayton will be combined into a single group under the leadership of Dr. George L. Wesp.

Howard S. Bergen has been appointed assistant coordinator of the plasticizers, resins, and solvents group of the Organic Div., Development Dept.; Seth U. Shorey was promoted to manager of plasticizers and resins sales, and B. B. Langton to manager of intermediates sales of the Organic Chemicals Division.

Koppers Pittsburgh Co., a new Delaware corporation owned jointly by Koppers Co., Inc., and Pittsburgh Plate Glass Co., has taken title to the phthalic anhydride plant at Kobuta, Pa.

An addition to the Kobuta phthalic anhydride plant which will materially increase its production was recently completed. The Chemical Div. of Koppers will continue to operate the enlarged plant for Koppers Pittsburgh Co.

Chas. Pfizer and Co., Inc., 11 Bartlett St., Brooklyn 6, N. Y., has announced changes in executive capacities of its key personnel as follows:

John E. McKeen, formerly vice-president in charge of all the company's plants, has been elevated to the newly created position of executive vice-president. Fred J. Stock has been named vice-president in charge of sales. John L. Davenport, formerly secretary and general superintendent, has been promoted to vice-president in charge of production. John J. Powers, Jr., who has been assistant to the president, is now secretary of the company.

Nixon Nitration Works, Nixon, N. J., is now represented in the Indiana and Michigan territory by C. H. Whitlock and Associates, 1601 Fisher Bldg., Detroit, Mich. Mr. G. L. Lotz is working all of Ohio and the western section of New York and Pennsylvania. W. G. Tucker, in addition to his present territory, has taken over the Albany and Troy area.

Chicopee Manufacturing Corp., 47 Worth St., New York, N. Y., has completed construction of a 10,000-sq. ft. addition to its main plant for the production of Lumite woven saran screening and fabrics at Cornelia, Ga. The expansion provides 20% more space at the plant.

General Electric Co. has appointed Harold F. Smiddy a vice-president of the firm. He will continue as general manager of both the company's Chemical Dept., at Pittsfield, Mass., and the Air Conditioning Dept. at Bloomfield, N. J.

New appointments in the company's Chemicals Div. include: H. Arthur Howe, manager of the Pittsfield, Mass., phenolic products plant and the Coshocton, Ohio, varnish plant; Wyman Goss, section engineer in charge of engineering on phenolic resins and compounds; and J. Rae Stirrat, sales manager of phenolic products—all Pittsfield men. Harold G. Deters of Cawker City, Kan., has joined the division as assistant sales manager of alkyd resin products, with offices in Schenectady, N. Y.

Kenneth J. Barlow has been named manager of sales administration for the Plastics Div. of the Chemical Dept.

Alden K. McCollum has been named manager of the company's laminated plastics plant at Coshocton, Ohio. He succeeds Arthur C. Treece, who has continued to supervise operations since his appointment last October as assistant to the Plastics Div. manager with responsibility for coordination of sales, engineering, and manufacturing of laminated products.

Process Industries Engineers, Inc., Box 5145, E. Liberty Station, Pittsburgh 6, Pa., has been organized to provide sales and engineering services to the chemical industry and processing field. It will sell equipment of various nationally known manufacturers where engineered applications are satisfactory; it will also design and fabricate equipment where special designs are necessary.

Company officials are Wm. W. Calihan, formerly director of sales and advertising of The H. K. Porter Co., Inc., R. R. Maccary; R. E. Nelson; and R. F. Fey.

Irvington Varnish & Insulator Co., Irvington, N. J., has announced a new plastic tubing, known as Temflex 105, approved by Underwriters' Laboratories, Inc., for continuous use at temperatures up to 105° C. The tubing has an abrasion-resistant identification marking which runs the entire length of the tube.

Auburn Button Works, Inc., Auburn, N. Y., has announced changes in the personnel of its sales engineers as follows: Ohio, William Lohrand, 174 Oakwood Ave., Barberton, Ohio; Philadelphia and environs, Nathaniel Grinnell, 905 Bellevue Court Bldg., 1418 Walnut St.,

PRECISION-MADE MOLDS

for INJECTION, COMPRESSION TRANSFER MOLDING

Plastic Mold Tool & Die Co., designers and builders of all types of molds for plastics offers to the industry:

Expert design and engineering service.

Complete, modern and diversified mold-making equipment manned by expert moldmakers.

Our engineers will gladly consult with you regarding your design and moldmaking problems and requirements.

PLASTIC MOLD TOOL & DIE CO.

E. RUTHERFORD, N. J. RU 2-7757

A PRODUCT OF Kimberly Clark RESEARCH

Kimpreg*

REG. U.S. PAT. OFF.

PHENOLIC RESIN IMPREGNATED PLASTIC PAPER

A versatile material. Used for filters, cafeteria trays, paper base laminates and as a core for decorative laminates.

Solves many problems in costs, quality and volume.

Send your requirements. Free engineering advice available.

Kimberly-Clark Corporation
Plastics Division · Neenah, Wis.

*T. M. Reg. U. S. Pat. Off.

P.I.E. SCORES AGAIN

The STAMPOMATIC COLOR INLAY PROCESS

An Entirely New Method of Color Inlay in Plastics

At last—an automatic press that inlays one or more colors at a single feeding, at the rate of 50 to 60 finished pieces per minute. Yes—there are STAMPOMATIC models to handle any item, large or small, all with amazing speed and efficiency.

STAMPOMATIC exclusive *CUSHIONED IMPRESSION* eliminates costly plastic breakage and assures trouble-free operation. See how the STAMPOMATIC can step up production and bring costs down.

Write for complete details.

PRINTING INDUSTRIES EQUIPMENT, INC.
135 West 20th Street New York 11, N. Y.

THE PLASTISCOPE

Philadelphia 2, Pa.; in New York, N. Y., Bob Knapp has joined W. O. Strong in the firm's new office at 1775 Broadway, General Motors Building.

William Whitman Co., Inc., has announced the creation of a subsidiary, Whitman Plastics, Inc., which is now manufacturing vinyl film at a plant in Lynn, Mass. Products will be marketed through the Whitman Company as selling agents. Ralph A. Nelson, formerly with the U. S. Rubber Co. and the Velveray Corp., has been appointed sales manager of the Plastics Div. and will make his headquarters at the company's offices at 261 Fifth Ave., New York, N. Y.

The Whitman company has been in the textile industry for 84 years; sales for the fiscal year 1948 were approximately $80,000,000.

Taylor Fibre Co. has announced the appointment of F. J. Hutta as district sales manager for New York City and the surrounding area. The firm's new office address is 50 Church St., New York, N. Y.

Goodyear Tire and Rubber Co., Akron, Ohio, has created a vinyl film and fabric sales department, headed by James S. Bruskin, who has had some 12 years experience in the plastics fabric field. Assisting Mr. Bruskin are E. J. Dunlavy and W. E. Channing, previously with the Pliofilm department.

United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y., has announced a group of non-crazing coatings developed especially for use on acrylic, cellulose acetate butyrate, and polystyrene, as an addition to its line of Unichrome Product Finishes. Both face and backing coats are included.

PERSONAL NEWS

C. O. Richards has been appointed general sales manager of all divisions of The Standard Products Co., 2130 W. 110th St., Cleveland, Ohio. Mr. Richards will be stationed in the company's Detroit, Mich., sales offices at 316 Fisher Bldg.

Paul H. Scrutchfield has resigned from the Stamford Laboratories of the American Cyanamid Co. and is now practicing as a consulting chemist with headquarters at 1237 Church St., Hannibal, Mo. Dr. Scrutchfield was formerly a research chemist with the Hercules Powder Co. and General Electric Co.

M. A. Heikkila has resigned from The New Jersey Zinc Co., where he has been in charge of luminescent pigment promotion. He has made no announcement of his future plans.

Mr. Heikkila will be succeeded by Harvey E. Brown, who has been with New Jersey Zinc for 25 years and is presently in the company's market development department.

Henry W. Harding, formerly president of Manufacturers Chemical Corp. and Chemaco Corp., and more recently in the plastics materials section of Koppers Co., has resigned the latter position to become executive vice-president of the Stewart Hartshorn Co., manufacturers of shade cloth, window shades, and other coated fabrics, 250 Fifth Ave., New York 1, N. Y.

Leo B. Grant has been named manager of the New York sales office of The Dow Chemical Company, succeeding Ralph E. Dorland, who held that position from 1919 until his death last May. Mr. Grant was associated with Dow's Magnesium Div. in Midland, Mich., for 20 years before joining the executive staff of its New York office about a year ago.

Osgood V. Tracy has been appointed manager of the Chemical Products Dept., Esso Standard Oil Co., 15 W. 51st St., New York 19, N. Y. He was formerly assistant manager of the department and has been closely associated with the development of synthetic rubbers, alcohols, and other chemical products from petroleum. He will continue as a director of Enjay Co., Inc., chemical products marketing affiliate of Esso.

Dr. J. A. Murray; Dr. J. Kenson Simons; and **David E. Cordier** have been appointed associate directors of research in the Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio. Dr. Murray will be concerned particularly with direction of research on glues and industrial resins; Dr. Simons will direct fundamental chemical research; and Mr. Cordier will be concerned primarily with molding compound research.

L. A. (Pat) Shea has joined the Shaw Insulator Co. which he will represent in Illinois and Indiana on thermosetting molding projects. His headquarters are at 163 Linden, Oak Park, Ill.

Gilbert Spillert, formerly with Standard Cap and Seal Corp., is now with Western Products, Inc., Newark, Ohio, as assistant to L. S. Meyer.

Ernest H. Stofel has joined the Engineering Dept. of Mayflower Electronic Devices, Inc., 6014 Hudson Blvd., West New York, N. J.

MEETINGS

March 10-12—17th Annual Meeting, American Society of Tool Engineers, Hotel William Penn, Pittsburgh, Pa.

March 14-17 — Chicago Technical Societies Council, Technical Conference and Production Show, Hotel Stevens, Chicago, Ill.

March 17-19—Sixth Annual Spring Conference, Pacific Coast Section, Society of The Plastics Industry, Inc. Biltmore Hotel, Santa Barbara, Calif.

April 11-14 — 1949 Conference, National Association of Corrosion Engineers, Cincinnati, Ohio.

May 10-13 — 18th Annual National Packaging Exposition in the Public Auditorium, Atlantic City, N. J. Annual four-day American Management Association Conference on Packaging, Packing, and Shipping will be held in the Auditorium May 10-13, concurrent with Exposition.

May 19-21 — Spring meeting, Society for Experimental Stress Analysis, Hotel Statler, Detroit, Mich. Inquiries should be sent to the Society at P. O. Box 168, Cambridge 39, Mass.

May 26-27 — Annual meeting Society of The Plastics Industry, Inc., Edgewater Beach Hotel, Chicago, Ill.

Nov. 1-5 — Pacific Chemical Exposition, San Francisco Civic Auditorium, San Francisco, Calif.

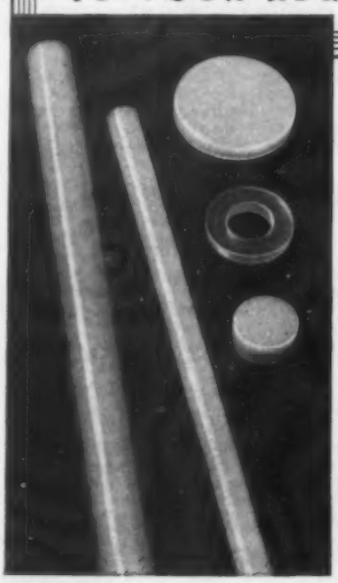
MAKE GILT-EDGE INVESTMENTS
with YOUR PLASTIC PRODUCTS

A gilt-edge investment is one which is sure to return a profit . . . and when Mirro-plex coats your plastic brooches, clips, sprays, earrings, charms, bracelets and other plastic jewelry with glistening simulated gold or silver, these ordinary articles are transformed into certain money makers. Mirro-plex gold or silver coatings cost very little and increase the beauty and sales value of your products tremendously.

Avoid hazarding shelf-sitting plastic jewelry. Make sure they sell! Send us samples of your products for plating — no charge, of course. See how much more saleable they look when plated by Mirro-plex.

mirro-plex, inc.
"Finishes that Sparkle"
A SUBSIDIARY OF INTER-STATE PRODUCTS CO.
160 FIFTH AVENUE • NEW YORK 10, N. Y.
WAtkins 9-3030

NYLON . . MOLDED TO YOUR REQUIREMENTS



VALVE SEAT DISCS
in FM-10001 (Rigid) Nylon

VALVE WASHERS
in FE-1044 (Semi-Rigid) Nylon

CONTRACT NYLON MOLDING
We have the set-up and the experience to give you the best in nylon parts molding in small or large quantities.

SEND FOR QUOTATIONS ON SPECIFIC REQUIREMENTS

NYLON RODS
FOR IMMEDIATE DELIVERY
in ¼", ⅜" and ⅝" diameters and 8¾" lengths in FM-10001 Nylon. Quantity prices on request.

S.S.WHITE PLASTICS DIVISION
THE S. S. WHITE DENTAL MFG. CO. — DEPT. M — 10 EAST 40th ST., NEW YORK 16, N. Y.
FLEXIBLE SHAFTS AND ACCESSORIES
MOLDED PLASTICS PRODUCTS—MOLDED RESISTORS

FASTER PACKAGING WITH THIS PORTABLE BAGGER

EASY TO USE
LOW IN COST

Designed to handle bagged products with a minimum of effort at a maximum speed. Simple adjustments for height... tilting forward or backward enables operator to set machine at easiest position. Stainless steel trough with capacity of 200 bags. Adjustable to bag sizes. Blower keeps bag clean and free from foreign matter.

See us at the National Packaging Exposition.

Send today for Bulletin No. 3-31

ROCKFORD Anderson BROS. MFG. CO. ILLINOIS

ANDERSON BROS. MFG. CO., ROCKFORD, ILLINOIS

All classified advertisements payable in advance of publication. Rates: $5.00 up to sixty words; enclosed in border, $10.00 per inch.

Classified Advertisements

For further information address Classified Advertising Department, MODERN PLASTICS, 122 East 42nd Street, New York 17, New York

MODERN PLASTICS reserves the right to accept, reject or censor classified copy.

EMPLOYMENT • BUSINESS OPPORTUNITIES • EQUIPMENT (USED OR RESALE ONLY)

SAVE WITH GUARANTEED REBUILT EQUIPMENT-HYDRAULIC PRESSES: 30" x 30", 20" ram, 1000 tons, 36" x 36", 19" ram, 425 tons; 30" x 30", 17" dia. ram, 340 tons, 24" x 24", 18" ram, 382 tons; 42" x 42", 16" ram, 250 tons; 30" x 30", 16" ram, 300 tons; 36" x 52", 14" ram, 385 tons; 24" x 24", 14" ram, 192 tons; 36" x 36", 12" ram, 141 tons; 24" x 24", 12" ram, 141 tons; 24" x 20" 10" ram, 118 tons; 20" x 20", 10" ram, 118 tons; 19" x 24", 10" rams, 78 tons; 22" x 15", 8" rams, 75 ton, 15" x 15", 8" ram, 75 tons; 12" x 12", 7½" ram, 50 tons; 12" x 12", 6½" ram, 42 tons; 8" x 9½", 4½" ram, 20 tons; 16" x 16", 3½" ram, 13 tons; **PUMPS;** NEW DUAL PUMPING UNITS, all sizes, Worthington Triplex 12 gal. 2200#; 4 plunger, 6 gal. 2000#; Watson Stillman Duplex Box type 1 gal. 2500#, Worthington 1 gal. 10000#; **NEW LABORATORY** 6" x 12" M.D. MILLS; Thropp 16" x 40" M. D. MILL; Extruders; Plastic, NRM size 1½ and 2½ Units; Preform Machines; Stokes R and T, Colton 5 and 5½ T; Mixers; Accumulators, Vulcanizers, etc. UNIVERSAL HYDRAULIC MACHINERY COMPANY, 285 Hudson St., New York 13, New York.

HYDRAULIC PRESSES BUILT to specifications for Plastic Items. Record Presses, producing two per min. We have in the used equipment (1) 1000 ton 30 x 30, 20" ram, 14" stroke, 24" day-light $1800. (1) 600 ton 40 x 48, 18" ram, 36" stroke, 12' day-light $2200. (1) 500 ton 22 x 48, 18" ram, 24" stroke, $1800. (1) 400 ton 22 x 30, 16" ram, 18" stroke, day-light 36" $1500. (2) 200 ton, 42 x 46, 12" ram, 36" stroke, 48" day-light $1200 each (2) 80 ton, 11-½ x 11-½, 10" ram, 10" stroke, 3 post downward acting self-contained $1000.00 each. Sal's Press, 386-390 Warren Street, Brooklyn 2, New York. MAin 4-7847.

FOR SALE Hydro Pneumatic Accumulator, 13 Gal. 3500#. Ball & Jewell Rotary Cutter. Model R and "T" Stokes Tablet Machines. 50 Ton Press with 18" x 18" Electric Plates. 100 ton 20" x 20" press. Racine Pumps, Boosters, Valves, Logan Pumps, Valves. Self-Contained—200 H.P. 75 Gal. 3000# Pump. 200 H.P. 200 Gal. 1500# Pump 18" x 15'. Accumulator 1500#.—15" x 11' Acc. 400-2000". 6" x 9' Accumulator-2000#. 300 Ton Press 20" Ram, 8" Stroke, 24" x 20" Platen. 500 Ton—1000 Ton Hobbing Press—Hele Shaw Variable Pressure 33 GPM 2500#—Vickers Oil Pumps 17 GPM 500 to 1000#. Elmes Horo. 4 Plunger 6—Gals. 5000#. Stillman 12" x 12" Laboratory Presses. Aaron Machinery Co., 45 Crosby St., NYC.

WANTED: PLASTIC Scrap or Rejects in any form. Cellulose Acetate, Butyrate, Polystyrene, Acrylic, Vinyl Resin, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding and magnetizing. Reply Box 318, Modern Plastics.

WANTED: PLASTIC VINYL SCRAP Black, all gauges, Clear and Clear Transparent in all colors. Top prices paid. Large quantities, carload lots. Reply Box C819 Modern Plastics.

INDUSTRIAL DESIGNER—Stylist with creative ability, experienced in production and product development in compression and injection molding, sheet forming and casting resins, desires connection with molder, fabricator or progressive manufacturer of products in which plastics play an important part. Free lance or part time basis. Chicago area preferred. Reply Box C744, Modern Plastics.

CAN USE A QUANTITY of off grade, off color, or off price cellulose acetate in colors and clear crystal. Reply Box C854 Modern Plastics.

FOR SALE: Farrell 15" x 36", 2 Roll Rubber Mill, other size 30" to 84"; Royle #2 Perfected Extruder; 500 ton Hydr. Molding Press 42" x 48"; Field 500 ton 25" x 30"; Francis 200 tons; 24" x 18". Albert 100 Ton, 2 opening, 24" x 24". Also presses 20 to 250 tons from 12" x 12" to 36" x 36" & 40 ton Broaching Press. Watson-Stillman Hor. 4 plgr. 1" x 2" x 4" H. & L. Pressure Pumps; HPM 1⅝" x 6"; vertical triplex 10 GPM 2700 lbs.; 7 Hydr. Oil Pumps, Vickers, Oilgear, Northern, etc., Elmes 1" x 4" & 1¼" x 4" hor. 4 plgr. 5 to 8 GPM 4500 lbs. & 5500 lbs., Elmes 2" x 6" hor. 30 GPM, 2500 PSI.; Rumsey 4½" x 8" vert. Triplex 65 GPM 900 lbs.; Elmes 2½" x 4" hor. 17 GPM 850 lbs.; Hydr. Steam Pumps; Low Pressure Pumps 150 to 600 lbs. Hydr. Accum.; Stokes type 200 Automatic Molding Press, Stokes Rotary Preform Tablet Machines 1-3/16", 1¼" and ⅝", also single punch; Injection Molding Machines 2 oz. to 12 oz.; Baker Perkins Jacketed Mixers 200, 100, 50, 20, 9 & 0.7 gals. capacity; New and used Rotary Cutters; Rubber Mills; Calenders, Banbury Mixers, etc.; Heavy duty Mixers; Grinders; Pulverizers; Gas Boilers, etc. PARTIAL LISTING. WE BUY YOUR USED MACHINERY. STEIN EQUIPMENT CO., 90 WEST ST., N. Y. 6, N. Y. WOrth 2-5745.

WANTED: MOLDS (all items) and Machines: Injection, Transfer, Extruding. Can act quickly and pay cash if you describe fully naming: Maker, Serial Number, Age, Condition, Capacity, Where seen, Lowest Price, and also Wt. of molded part or picture of piece from molds. Are samples available? Reply Box C733, Modern Plastics.

FOR SALE—1—Watson Stillman Hydro-Pneumatic High and Low Pressure Accumulator System, complete; 1—Van Dorn Experimental Injection Molding Machine; Other Injection Molders up to 22 oz; 2—150 Ton Semi-Automatic Self-Contained Hydraulic Presses; 1—Royle #½ Plastic Extruder 1¾" cylinder, other up to 8" cylinders; Two Roll Compounding Mills 6 x 12" up to 22 x 60"; Complete equipment for manufacture of molding powders. Send us your inquiries. CONSOLIDATED PRODUCTS CO. INC., 13-14 Park Row, New York 7, N. Y.

IF YOU HAVE GOOD HYDRAULIC PRESSES with modern pumping equipment for sale send me your specifications of same with photo, and I will see to it that you will get the best price available. Sal's Press, 386-390 Warren Street, Brooklyn 2, New York.

WANTED TO PURCHASE one or more molds, for 4 or 5 ounce, 8 or 9 ounce tumblers, Dishes which are plain, medium sized. Lamp shade mold. Molds for plain, low and medium priced. Please state condition, number of cavities, etc. Reply Box C851 Modern Plastics.

EXTRUDERS WANTED 1" to 6". Please describe fully, naming maker—age—condition—where seen and lowest price. Reply Box C853 Modern Plastics.

ESTABLISHED SALES ORGANIZATION Seeking Plastic Toys, Housewares or Novelties on commission basis, good contacts with Jobbers, Chains and Department Stores. Would also consider financial interests in new molds. Reply Box C852 Modern Plastics.

MANUFACTURERS ATTENTION

Dutch distributor with large sales organization in the Netherlands is interested in representing capable producer of molding powders and semi-finished products. Preferred phenolics and vinyls. Contact H. J. van der Ryn, Inc., 92 Liberty Street, New York 6, New York.

HYDRAULIC PRESS, 200 tons, Racine pump and booster, Tompkins-Johnson pull backs, Seely timing controls, 36 by 36 platen, 30 inches daylight, 28 inch ram. Write R. J. Mackay, 68 West Oakwood Pl., Buffalo, N. Y.

FOR SALE

Two (2) steam driven hydraulic pumps. Horizontal, Single style, double acting plunger type. Pump sizes 5½" x 1¼" x7" Dean and 6⅛" x ⅞" x 8" Burnham. .Pressures to 10,000 lbs. Will sell very reasonable. Inquire Layne-Northern Company, 401 S. Delorenzi Ave., Mishawaka, Indiana.

WANTED: Mold for Full Pack Pouch type Cigarette Case. Will purchase other molds, prefer smoker's and household items in Compression or Injection molds for foreign country. Describe fully, giving condition of Mold, weight per piece, weight of complete shot, overall size of Mold, type of machine adapted to. Will pay cash. Reply Box C850 Modern Plastics.

WANTED TO PURCHASE

all types of plastic scrap, particularly

VINYL & POLYETHYLENE

INDUSTRIAL BURLAP & TEXTILE COMPANY

1128 Spring Street, Elizabeth, New Jersey.

POSITION DESIRED by young man with 5 years' experience as general manager of plastic mold plant. Experienced estimator; familiar with molding materials and their applications, mold design, construction, and shop problems. Directed $100,000 sales with 25 employees. Office experience. 3 years college, engineering background. Sales experience and contacts. References. Reply Box C843 Modern Plastics.

FOR SALE—Lucite. Clear tubing 10 ft. x .375 x .250. Solid cast rods 48 in. x .750 Baxter Plastics, 26 Market St., Chattanooga 2, Tennessee.

WANTED: PLASTIC MATERIALS AND manufactures by mfrs. representative for foreign markets and Northern California. P. O. Box 1320, San Francisco.

FOR SALE

1—Plasticator Model 15/20 practically new, complete with pump, motor and all electric countrols.

1—Cumberland Plastic Grinder size A-1½, excellent condition with 15 HP motor. Reply Box C846, Modern Plastics.

FOR SALE—Hot Roll Leaf Embossing Press—Ackerman Gould Co., bench type, No. M-P, Chase. Capacity 1½" x 4½", 110 V.—60 Cycle. Reply Box C844 Modern Plastics.

WANTED: SALES REPRESENTATIVE for acrylic fabricator. Knowledge of precision forming and fabricating methods important. Commission basis. Reply Box C845 Modern Plastics.

(*Continued on page* 170)

A BOTTLECAP EVERY 2 Seconds

MORE THAN 34,000 CAPS EVERY 24 HOURS . . .

THAT'S the production capacity of this 12-cavity injection mold, designed and built by Newark Die for shipment to I. K. I., Voorschoten, Holland, exported through W. G. Whitehouse, New York.

This is but one of thousands of compression, transfer and injection type molds we have been making for the plastics industry for the past 30 years. We have solved many multiple-cavity-mold problems. Let us solve yours too.

Send for our free booklet, "The Procedure of Die Hobbing"

NEWARK DIE COMPANY
22 Scott Street Newark 2, N. J.

NOCO TRADE MARK

As mold opens, horizontal rack moves internal gears, unscrewing 12 caps simultaneously from the mold cores.

INORGANIC PIGMENTS
for plastics

PERMANENT • DEPENDABLE
RESIST FADING AND HIGH TEMPERATURES
INSOLUBLE IN SOLVENTS and PLASTICIZERS

Suitable for

CASTING • INJECTION or COMPRESSION MOLDING • CALENDERED FILMS AND COATING PROCESSES

LET US KNOW THE APPLICATION

B. F. DRAKENFELD & CO., INC.
45-47 Park Place, New York 7, N. Y.

Drakenfeld

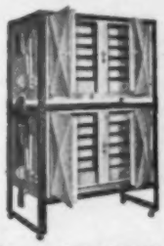
BROSITES OVENS and DRYERS

• SIMPLE AND FAST TO OPERATE

MODEL NO. 1
Single Door: Width 24½"
Height 50" — Depth 28½"
Five trays 15" x 22" x 2½"
Heating Element 1800 watts.
Thermostatic Control
100° to 300° F.

MODEL NO. 2
Double Door: Width 48"
Height 50" — Depth 28½"
Ten trays 15" x 22" x 2½"
Heating Element 3600 watts.
Thermostatic Control
100° to 300° F.

MODEL NO. 3
Double Decker:
Width 48"
Height 68½" —
Depth 28½"
Twenty Trays
15" x 22" x 2½"



Model No. 3 is two Model-2 units placed one above the other. They can be operated independently of each other and the top unit can be faced in opposite direction when desired.

RUGGED, made to last...EFFICIENT, economical to use

The trays are of such size and design to hold approximately 10 pounds of the average material when placed to a depth of about one inch. Special trays of expanded metal allowing greater circulation of heat can be supplied and are recommended for the pre-heating of pellets and other solid objects. For special uses the trays, or the entire unit if required, can be made of stainless steel, monel metal or nickel. Sturdy in construction, built of steel sheeting, carefully and thoroughly insulated with rock-wool insulation placed between the inside and outside shells of the dryer. Mounted on casters for easy movement from one location to another in the plant. Each unit is equipped with thermostat to automatically control temperature of the oven. A light indicates when unit is in operation.

• JUST PLUG IN AND TURN THE SWITCH

DE MATTIA GRANULATOR

For the uniform grinding of Vinylite, Geon and all hard thermoplastics.

Capacity: 200 lbs. per hr.

3 H. P. motor.

DE MATTIA CHUNK CUTTER

For low-cost salvage of larger slugs and chunks and molded pieces too tough for the average sprue and scrap grinder.

Capacity: over 150 lbs. per hr.

3 H. P. motor

BROSITES MACHINE COMPANY INC.
50 CHURCH STREET (Cable Address—BROMACH) NEW YORK 7, N. Y.
TELEPHONE BARCLAY 7-3600

(Continued from page 168)

FOR SALE: 100,000 feet Textolite tubing, a paper base phenolic laminate, with desirable mechanical, electrical and chemical properties. 5" outside diameter, 4½" inside diameter ¼" wall. Length of clear sections 9' 6". This material was manufactured for the Government by General Electric. It has not been subject to use. Will withstand in excess of 500 p.s.i., can be threaded, drilled, etc., and is not subject to corrosion. Available at a low fraction of original cost. Prices, specifications and sample section on request. Reply Box C814 Modern Plastics.

AVAILABLE: 14 years experience & ability in supervision of compression molding & finishing. Familiar in all phases, including estimating, cost control, production control and personnel. Prime requisite is opportunity for advancement. Will locate anywhere. Can furnish best of references. I am 43 years of age, in good health and married. Reply Box C849 Modern Plastics.

EXTRUSION ENGINEER; thoroughly experienced in continuous extrusion of thermoplastics, compounding and allied subjects desires responsible position with progressive organization. Will work anywhere but prefer North West section of United States. Reply Box C839 Modern Plastics.

FOR SALE

1—Hungerford Plastimaker type 150 H.H. complete with drive, control panel, Toledo Scale, plasticizer tank, air heater tank, electrically heated temperature controlled cone enclosure, extra spray guns, three sets of cintered bronze and plates. This equipment was used for experimental work and is in excellent operating condition. Reply Box C847 Modern Plastics.

INJECTION MOLD FOR SALE. Four cavity ring mold with mold bases for 1 oz. Van Dorn Press. Almost new. Sample molding sent on request. Reply Box C848 Modern Plastics.

TUMBLER POLISHER For Sale, 4 barrel Lupomatic #48MH36 with or without 2 HP, 8P motor. Only 300 hours use. Will accept reasonable offer. Also have about 1500 pounds plastic polishing compounds on hand. 738 NE 79th St., Miami 38, Fla.

LUCITE & PLEXIGLAS

New material, .080 75¢ per sq. ft., .100 80¢ sq. ft., .125 90¢ sq. ft. .187 $1.10 sq. ft No charge for cutting to size .080 to .500 salvage. ⅝" cast rod. .125 and .250 Florescent below list. .080 Green #260 salvage 35¢ lb. Aristocrat Plastics, Inc. 55 Clarkson St., N.Y.C. WAtkins 4-4216.

REPRESENTATIVES WANTED—Manufacturer of Vinyl film industrial products and specialty plastic packages seeks experienced agents on commission basis. Advise particulars; territory, present items, etc. Reply Box C840 Modern Plastics.

NEED A NEW YORK OFFICE AND SHOW ROOM? Industrial design firm doing work in plastics exclusively offers show room space, sales services, and office facilities to progressive molder or fabricator who desires to reach prospects in New York and Metropolitan area. Reply Box C841, Modern Plastics.

WANTED: COMPLETE INJECTION, Extrusion & Compression Molding Plant. Eastern location preferred. All replies confidential. Reply Box C838 Modern Plastics.

FOR SALE: 6 and 8 oz Reed, 2 and 9 oz HPM Injection Presses. 1½" and 2½" NRM Extruders. Ovens, Granulators, Tumblers, Temperature Circulators. 20, 100 Tons Compression Presses. 1—150 tons 24 x 24 Pl. self contained Compression Press. Kux Preformpress 60A. Colton Preformpress 5½"T. Justin Zenner, 833 W. Sheridan Road, Chicago 13, Ill.

WANTED BY INJECTION MOLDER 100,000 pounds of Reground Polystyrene. Will pay 15¢ per pound if material is suitable. Advise colors and quantity available. Reply Box C842 Modern Plastics.

PLASTIC PLANT SUPERINTENDENT

Chicago plant is seeking man capable of setting up production methods. Must have excellent knowledge of tools, dies, jigs, and fixtures; must be familiar with shop systems, and capable of setting up plant routines. State experience, references, qualifications, and starting salary. Reply Box C857, Modern Plastics.

OFFERING FOR SALE—Plastic Molding Compound, Phenol Formaldehyde, Black, Gen. Purpose, Medium Flow. 100,000 lbs. at 15¢ per lb. Urea Formaldehyde, Black, Medium Flow, 20,000 lbs. at 18¢ per lb. Reply Box C855 Modern Plastics.

CHEMICAL ENGINEER WANTED:

Established Eastern manufacturer requires the services of chemical engineer to develop and set up production for impregnation of paper tubes with Bakelite or other resins. Applicant should have had practical experience in such processes. Reply Box C856 Modern Plastics.

PLASTICS AND RUBBER Thropp Calender, 3-Roll, 16" x 6", Surplus, in use; also Laboratory Mill. Reply Box C859 Modern Plastics

FOREIGN INDUSTRIAL ORGANIZATION desires to build a plant for manufacturing polystene. Would like to have quotations for complete equipment necessary for polymerization of monomer. Reply Box C858 Modern Plastics.

New **MOSLO Minijector**

UNIVERSAL 2oz. HYDRAULIC

Plastics Injection Press for Production Runs

Many Exclusive Features—for example, Dies can be operated at any angle—from Horizontal to Vertical position.

Push-Button Operated

•

Automatic or Semi-Automatic

•

We also manufacture ¾ oz. Moslo Minijectors

Write for Details and Prices

MOSLO MACHINERY COMPANY

2443 PROSPECT AVENUE • CLEVELAND 15, OHIO

GOING!

GOING!

(but not quite) GONE!

If you act now, you'll still be in time to get your copy of the 1948 Modern Plastics Encyclopedia. The supply is almost completely exhausted due to the heavy demand for this comprehensive 1673-page source book covering every phase of plastics.

HERE'S AN EASY WAY TO ORDER . . .

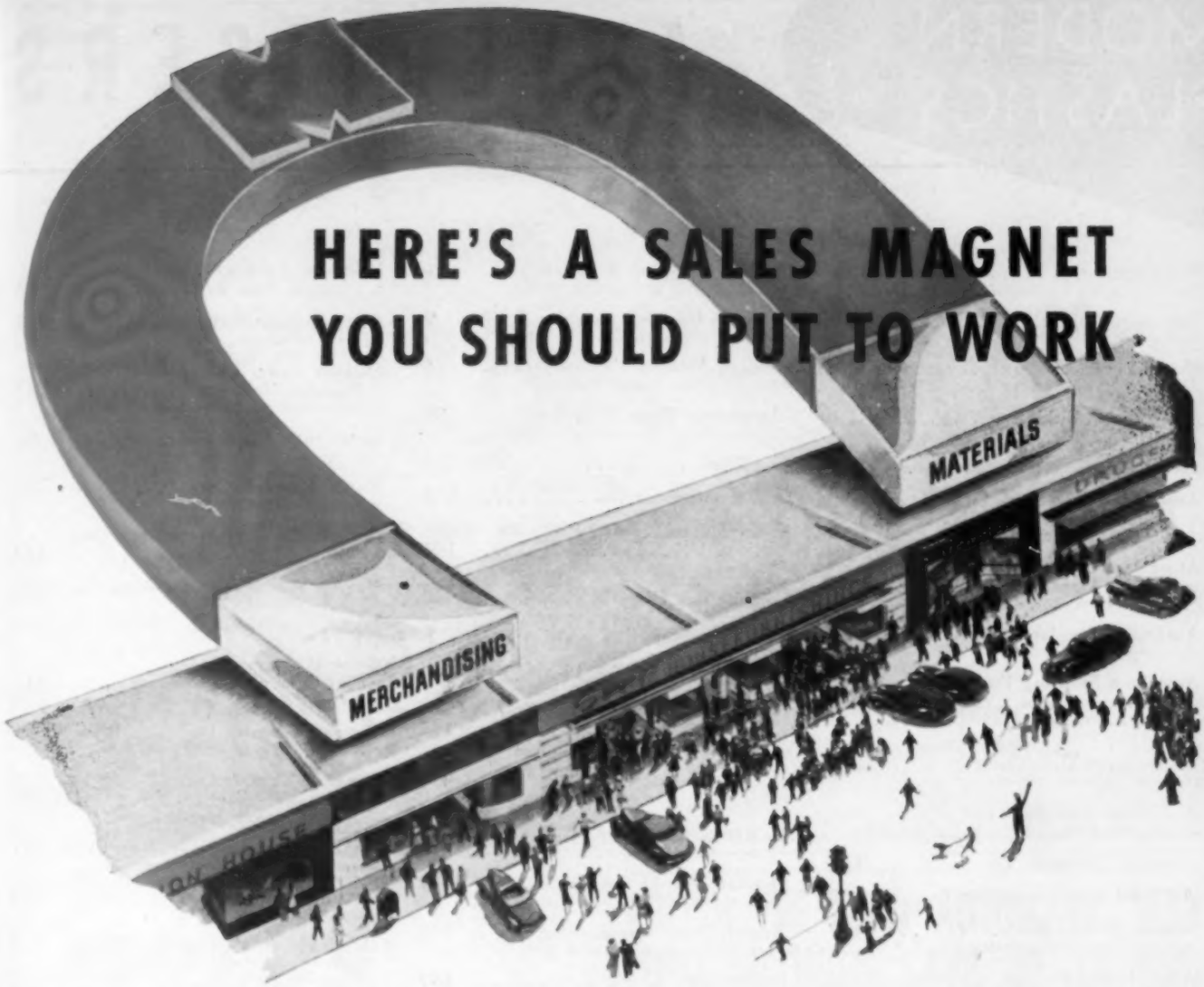
Just tear out this advertisement, sign it, attach it to your business letter-head, and mail both to us. We'll then send your copy—and bill you later.

The recently reduced price is $6.00 in the United States; $7.00 in Canada; $8.00 in other foreign countries, including duty and postage.

MODERN PLASTICS ENCYCLOPEDIA

122 E. 42ND STREET NEW YORK 17, N. Y.

HERE'S A SALES MAGNET YOU SHOULD PUT TO WORK



There's real pull in Monsanto's manufacturing and merchandising "know how" . . . pull that puts sales magnetism in your product for this 1949 Buyers' Market.

1.	**MATERIALS**—the best we know how to make.
2.	**MERCHANDISING**—the smartest ever offered molders.

About Monsanto's materials, you know. But do you know the extent of Monsanto's advertising and promotion *that you can cash in on?*

Take a look at this 6-point Monsanto program for 1949 . . . now being offered promotion-minded molders who want to add the power of Monsanto advertising to their own this year:

1. Here's the promotion for the current month . . . a full-page, 4-color cover advertisement in "The Saturday Evening Post" (March 12) featuring Tex and Jinx of radio fame . . . and a whole group of nursery products, molded of Monsanto Lustrex. Around this has been built a full-scale, nation-wide promotion with window trims, reprints, mats, radio material, etc. More promotions with more celebrities, more plastics products (housewares, toys, etc.) are coming.

2. Year-long continuous campaign to business executives in "Time" magazine, plugging plastics and you, the molders of America.

3. To the buyers in chain and department stores . . . a big campaign in 4 magazines selling them merchandise molded of Monsanto plastics, backed by Monsanto advertising.

4. A full-scale campaign in three publications to the industrial design field, promoting plastics as a material and the multiple advantages of plastics custom molding.

5. The veteran buyers' guide, "Monsanto Plastics Merchandiser", going to thousands of volume buyers from coast to coast regularly, now in its third year.

6. Direct mail materials, product labels, and reprints for molders own promotional campaigns.

Here's a full scale year 'round merchandising and advertising campaign . . . market-smart, sure-footed, continuous, sales building. You're urged to use it, profit by it. Ask the Monsanto man who calls on you for complete details . . . or use the coupon.

Lustrex: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS

MONSANTO CHEMICAL COMPANY, PLASTICS DIV.
Dept. MPLP 15, Springfield 2, Mass.

Tell me how I can participate in Monsanto's 1949 advertising promotion.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MODERN PLASTICS ADVERTISERS

MARCH, 1949

Ace Plastic Co. 129
Agency—Harold Marshall Adv. Co.

Adamson United Co. 20, 21
Agency—Smith, Taylor & Jenkins, Inc.

Allied Products Corp. 42, 149
Agency—Charles M. Gray & Assoc.

All-Purpose Gold Corp. 130

Allis-Chalmers Mfg. Co. 11
Agency—Compton Advtg., Inc.

American Cyanamid Co., Industrial Chemical Div. 135
Agency—Hazard Advertising Co.

American Cyanamid Co., Plastics Dept. 92, 93
Agency—Hazard Advertising Co.

American Insulator Corp. 54
Agency—Kamp & Godfrey, Inc.

American Molding Powder & Chemical Corp. 112
Agency—H. W. Fairfax Advtg. Agency, Inc.

American Pulverizer Co. 130
Agency—Eggers-Rankin Advtg. Service

Anderson Bros. Mfg. Co. 167
Agency—Cummings, Brand & McPherson

Argenta Products Co. 144

Art Roll Leaf Stamping Co. .. 108

Atkins, E. C., & Co. 127
Agency—Evans Associates Co.

Atlas Valve Co. 146
Agency—W. F. Schaphorst Agency

Bakelite Corporation Inside Back Cov.
Agency—J. M. Mathes, Inc.

Bamberger, A., Corp. 159
Agency—H. W. Fairfax Advtg. Agency, Inc.

Barker & Davis Co., Inc. 157
Agency—Ad-Service, Inc.—Advtg.

Boonton Molding Co., The .. 12
Agency—The Franklin Fader Co

Borden Co., The, Chemical Div. 34
Agency—Lawrence I. Everling, Inc.

Bridgeport Moulded Products, Inc. 40

Brilhart, Arnold, Ltd. 161
Agency—Alfred A. Morse & Co.

Brosites Machine Co., Inc. 169
Agency—Parker-Allston Assoc., Inc.

Buttondex Corp. 150
Agency—Lancaster Advertising

Cabot, Godfrey L., Inc. 31
Agency—Larcom Randall

Carbide & Carbon Chemicals Corp. 43
Agency—J. M. Mathes, Inc.

Carborundum Company, The .. 111
Agency—Comstock, Duffes & Co.

Carver, Fred S. Inc. 154
Agency—J. C. Bull, Inc.

Catalin Corp. of America 1
Agency—Walter J. Gallagher Advtg.

Celanese Corp. of America 9
Agency—Ellington & Co., Inc.

Chicago Molded Products Corp. 4
Agency—Almon Brooks Wilder, Inc.

Claremont Waste Mfg. Co. 94
Agency—Walter J. Gallagher Advtg.

Classified 168, 170

Cole Instrument Co. 143

Consolidated Molded Products Corp. 101
Agency—Walter J. Gallagher Advtg.

Continental Can Co. 50
Agency—Batten, Barton, Durstine & Osborn, Inc.

Cruver Mfg. Co. 46
Agency—Evans Assoc. Co.

Cumberland Engineering Co., Inc. 145
Agency—Richard Thorndike Precision Advtg.

DeMattia Machine & Tool Co. .. 15
Agency—George Homer Martin

Detroit Macoid Corp. 131
Agency—Holden, Clifford, Flint, Inc.

Detroit Mold Engineering Co. . 144
Agency—Charles M. Gray & Assoc.

Diemolding Corp. 157

DoAll Co., The 116
Agency—Weston-Barnett, Inc.

Dow Chemical Co., The 163
Agency—MacManus, John & Adams, Inc.

Drakenfeld, B. F., & Co., Inc. 169
Agency—Fuller & Smith & Ross, Inc.

Dunning & Boschert Press Co., Inc. 161

DuPont deNemours, E. I., & Co., Inc., Electrochemicals Dept. 103
Agency—Batten, Barton, Durstine & Osborn, Inc.

DuPont deNemours, E. I., & Co., Inc., Plastics Dept. 7
Agency—Batten, Barton, Durstine & Osborn, Inc.

Durez Plastics & Chemicals, Inc. .....**Inside Front Cover**
Agency—Comstock, Duffes & Co.

Eastman Kodak Co. 99
Agency—J. Walter Thompson Co.

Elmes Engineering Works of Amer. Steel Foundries 18
Agency—Erwin, Wasey & Co., Ltd.

Engis Equipment Co. 145
Agency—Central Advtg. Service

Erie Engine & Mfg. Co. 155
Agency—The Yount Co.

Erie Resistor Corp. 32
Agency—W. S. Hill Co.

Fabricon Products, Inc., Plastics Div. 150

Farrel-Birmingham Co., Inc. .. 175
Agency—Gassaway, Mark & Co.

Fellows Gear Shaper Co., Plastics Machine Div. 23
Agency—Hicks & Greist, Inc.

Felsenthal, G., & Sons, Inc. ... 26
Agency—Central Advtg. Service

Ferro Enamel Corp. 161
Agency—Fuller & Smith & Ross, Inc.

French Oil Mill Machinery Co., The 143

Furane Plastics & Chemicals Co. 129

General American Transportation Corp. 113
Agency—Weiss & Geller

General Electric Co. .... **Back Cover**
Agency—Benton & Bowles, Inc.

General Electric Co., Phenolic Materials Div. 151
Agency—Benton & Bowles, Inc.

General Industries Co., The .120, 121
Agency—Meldrum and Fewsmith, Inc.

Gering Products, Inc. 139
Agency—Ira S. Kahn Co.

Goodrich, B. F., Chemical Co. .. 3
Agency—The Griswold-Eshleman Co.

Gotham Plastics Corp. 125

Gougelman, Paul, Co. 156
Agency—E. H. Brown Advtg. Agency

Grigoleit Co., The 10
Agency—Kane Advertising

Hardesty Chemical Co., Inc. .. 109
Agency—Terrill Belknap Marsh Assoc.

Hauser Products, Inc. 149

Hercules Powder Co. 51
Agency—Fuller & Smith & Ross, Inc.

Heresite & Chemical Co. 100

Hydraulic Press Mfg. Co., The .. 13
Agency—The Jay H. Maish Co.

Industrial Synthetics Corp. 107
Agency—Ray-Hirsch Co., Inc.

Keyes Fibre Co. 25
Agency—Alley & Richards, Inc.

Kimberly-Clark Corp. 165
Agency—Foote, Cone & Belding

Kingsley Stamping Machine Co. 149
Agency—Stuart Stevens Advtg.

Koppers Company, Inc. 53
Agency—Batten, Barton, Durstine & Osborn, Inc.

(*Please turn to page* 174)

PLASTIC SCRAP

WE BUY IT
SELL IT
PROCESS IT

Plastics Division:

H. MUEHLSTEIN & CO. INC.

122 EAST 42nd STREET, NEW YORK 17, N. Y.

BRANCH OFFICES: Akron · Chicago · Boston · Los Angeles · Memphis
WAREHOUSES: Jersey City · Akron · Boston · Los Angeles · Memphis

MOLDS WANTED

for Plastic Toys, Jewelry, Household and related items

Highly rated manufacturer wants to enter into an arrangement for the use of your idle molds in his Canadian and Mexican plants.

A long or short term period can be arranged on a royalty basis that will prove to be extremely profitable to you.

Please give us a full description of your molds and items when you write that you are interested.

Address: **BOX D 860**
MODERN PLASTICS
122 EAST 42nd STREET
NEW YORK 17, NEW YORK

POLISH THE LUPO AUTOMATIC WAY
LUPO METHODS SAVE UP TO 85%

You can usually save more than 60% in the process of plastic finishing when you use Lupomatic barrels and the modern Lupo Procedure. The purchase of a Lupomatic installation from us entitles you to the expert advice of Joseph Lupo.

Mr. Lupo, who has over thirty-five years of experience in designing tumbling equipment and manufacturing compounds for the plastics and metal industries, heads our organization.

Send us your samples for a free demonstration . . . learn how you can improve your product, save time, space and money. Let us chart a tumbling procedure which will work with your production schedule.

LUPO RESEARCH LABORATORIES
9 NORTH WEST STREET, MOUNT VERNON, N. Y.
Mount Vernon 7-2423

(Continued from page 172)

Kuhn & Jacob Molding & Tool Co. 127
Agency—Eldridge-Northrop, Inc.

Kurz-Kasch, Inc. 17
Agency—Kircher, Helton & Collett, Inc.

Lane, J. H., & Co., Inc. 153

Lee Products, Inc. 138

Lester-Phoenix, Inc. 30
Agency—PDA

Lucidol Div., Novadel-Agene Corp. 159
Agency—Landsheft, Inc.

Lupo Research Laboratories .. 173

MacRay Engineering Co. 138
Agency—Stedfeld & Byrne, Inc.

McCarthy Chemical Co. 44
Agency—Wilkinson-Schiwetz & Tips, Inc.

Manco Products Co. 148
Agency—Charles M. Gray & Assoc.

Marblette Corp., The 47
Agency—MacLean Advtg. Agency, Inc.

Marbon Corporation 153

Martin, Glenn L., Co., The 29
Agency—Vansant, Dugdale & Co., Inc.

Martindell Molding Co. 109
Agency—Eldridge-Northrop, Inc.

Mayflower Electronics Devices, Inc. 156

Maywald, Elmer C., & Co., Inc. 145
Agency—Robert A. Gallagher Advtg.

Mearl Corp., The 148

Mears-Kane-Ofeldt, Inc. 126
Agency—R. E. Lovelin Corp.

Metal Fabricators 136
Agency—John Miller Advtg. Agency

Michigan Molded Plastics, Inc. 104
Agency—Wallace-Lindeman, Inc.

Midland Die & Engraving Co. 80
Agency—Behel and Waldie and Briggs, Inc.

Miller, Frank & Sons 138
Agency—Almon Brooks Wilder, Inc.

Mills, Elmer E., Corp. 37
Agency—Bozell & Jacobs, Inc.

Minnesota Plastics Corp. 22
Agency—Wilson Advtg. Agency

Mirro-Plex, Inc. 167

Modern Plastic Machinery Corp. 112
Agency—London Advtg. Agency

Modern Plastics Encyclopedia . 170

Molded Products Corp. 38
Agency—Cruttenden & Eger

Monsanto Chemical Co., Organic Div. 41
Agency—Gardner Advtg. Co.

Monsanto Chemical Co., Plastics Div. 171
Agency—Gardner Advtg. Co.

Mosinee Paper Mills Co. 48
Agency—Klau-Van Pietersom-Dunlap Assoc., Inc.

Moslo Machinery Co. 170
Agency—Stedfeld & Byrne, Inc.

Muehlstein, H., & Co., Inc. ... 173
Agency—Goold and Tierney, Inc.

Multi-Mold Products 116
Agency—Disner & Dorskind

National Rubber Machinery Co. 28
Agency—The Griswold-Eshleman Co.

Newark Die Co. 169
Agency—The Franklin Fader Co.

New Hermes 142
Agency—The Arnold Cohan Corp.

Nixon Nitration Works 36
Agency—Alfred A. Morse & Co.

Northern Industrial Chemical Co. 153
Agency—The Callaway Assoc.

Norton Laboratories, Inc. 119

Orange Machine Products Inc. 104

Owens-Corning Fiberglas Corp. 117
Agency—Fuller & Smith & Ross, Inc.

Packless Metal Products Corp. 126
Agency—Richard LaFond Advtg., Inc.

Parker-Kalon Corp. 24
Agency—Horton-Noyes Co.

Plaskon Div., Libbey-Owens-Ford Glass Co. 86, 87
Agency—Meldrum & Fewsmith, Inc.

Plastex Machine Corp. 122

Plastic Manufacturers Inc..... 45
Agency—J. C. Bull, Inc.

Plastic Mold Tool & Die Co. ... 165

Plastic Process Co., Inc. 35
Agency—H. C. Morris & Co., Inc.

Plastics Industries Technical Institute, Dept. of West Coast University 152
Agency—Larry Pendleton & Assoc.

Printing Industries Equipment Co., Inc. 165
Agency—Powerad Co.

Radio Receptor Co., Inc. 136
Agency—Walter Scott

Recto Molded Products, Inc. .. 154
Agency—Industrial Advertising

Reed-Prentice Corp. 8
Agency—Cutler and Quinn

Respro Inc. 16
Agency—Horton-Noyes Co.

Richardson Co., The 6
Agency—The Jay H. Maish Co.

Rohm & Haas Co., The Resinous Prod. Div. ... 133
Agency—John Falkner Arndt & Co., Inc.

Royle, John, & Sons, Inc. 103

Schwartz Chemical Co., Inc. .. 142

Shakeproof Inc. 157
Agency—Behel and Waldie and Briggs, Inc.

Sillcocks-Miller Co., The 143
Agency—Fred H. Ebersold, Inc.

Standard Products Co., The .. 152
Agency—F. B. Hubert Advtg. Counsel

Standard Tool Co. 146
Agency—The Davis Press, Inc.

Stanley Chemical Co. 141
Agency—Edward Owen & Co.

Stokes, F. J. Machine Co. 49, 140
Agency—John Mather Lupton Co., Inc.

Stricker-Brunhuber Corp. 147
Agency—Miller-Gould & Co.

Synthane Corp. 123, 124
Agency—John Falkner Arndt & Co., Inc.

Tennessee Eastman Corp. 105
Agency—Kenyon & Eckhardt, Inc.

Thropp, Wm. R., & Sons Co. . 147
Agency—Rickard Advtg. Agency, Inc.

Timken Roller Bearing Co., The 137

Titanium Pigment Corp. 39
Agency—Doyle, Kitchen & McCormick, Inc.

Tupper Corp. 14
Agency—Chambers & Wiswell, Inc.

Union Pacific Railroad 52
Agency—The Caples Co.

Van Dorn Iron Works Co., The 115
Agency—Bayless-Kerr Co.

Van Nostrand, D., Co., Inc. .. 141
Agency—J. M. Hickerson, Inc.

Varcum Chemical Corp. 33

Waterbury Companies, Inc. .. 122
Agency—Douglas Milne Assoc.

Watertown Mfg. Co., The 159
Agency—Wilson, Haight & Welch, Inc.

Watlow Electric Mfg. Co. 108
Agency—Eggers-Rankin Advtg. Service

Westchester Plastics Inc. 27

White, S. S., Dental Mfg. Co., The 167
Agency—Peterson & Kempner, Inc.

Witco Chemical Co. 19
Agency—Hazard Advtg. Co.

Wood, R. D., Co., The 147
Agency—Harris D. McKinney

Worcester Moulded Plastics Co. 176
Agency—C. Jerry Spaulding, Inc.

Yardley Plastics Co. 128
Agency—Byer and Bowman, Inc.

A BRESKIN PUBLICATION

MODERN PLASTICS

PUBLISHED BY MODERN PLASTICS, INC. • 122 EAST 42nd STREET, NEW YORK 17, N. Y.

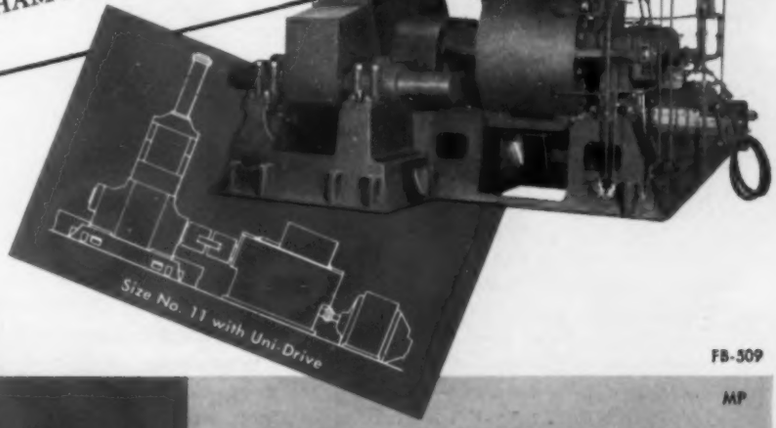
Size of Machine	Net Volume of Chamber Co. Ins.	Approximate Capacity Stiff Paste Pounds per Batch Factor x Specific Gravity	Motor Horsepower Standard and Double Speed	Approximate Floor Space	
				Length	Width
B	103	Sp. Gr. x 2.5	Four Speed $8\frac{1}{2}/12\frac{1}{2}$ 17/25 15/30	8'0"	3'0"
00	263	Sp. Gr. x 4	50/100	10'0"	4'6"
1	1193	Sp. Gr. x 24	50/100	12'0"	5'10"
1-A	1193	Sp. Gr. x 24	150/300	14'8"	6'0"
3-A	4315	Sp. Gr. x 100	150/300	23'0"	10'0"
3-A Uni-Drive	4315	Sp. Gr. x 100	300/600	25'0"	10'6"
11	14940	Sp. Gr. x 300	300/600	34'0"	13'6"
11 Uni-Drive	14940	Sp. Gr. x 300		32'3"	11'0"

THERE'S A BANBURY SIZE TO SUIT YOUR NEEDS EXACTLY

Banbury mixers are made in eight standard sizes for processing plastics, from the size B for laboratory or small production work to the No. 11 with its net chamber capacity of 14,940 cubic inches. With such a range of machines to choose from, you can select the mixer that will provide the production you require.

Furthermore, Farrel-Birmingham engineers have developed other production units, such as extruders, warming and sheeting mills, and calenders, which are *matched in capacity* with the various sizes of Banburys. This means that a layout can be *engineered* that will eliminate the "choking" or "starving" of any machine in the line. Production can be *designed* to flow without costly interruptions and with manual aid and supervision reduced to a minimum. Isn't this worth investigating?

Before you purchase new processing equipment, call in a Farrel-Birmingham engineer. In the meantime, send for a copy of *NEW* bulletin, "FARREL-BIRMINGHAM PROCESSING MACHINERY."



FB-509

MP

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn.; Buffalo, New York

Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston

Farrel-Birmingham

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

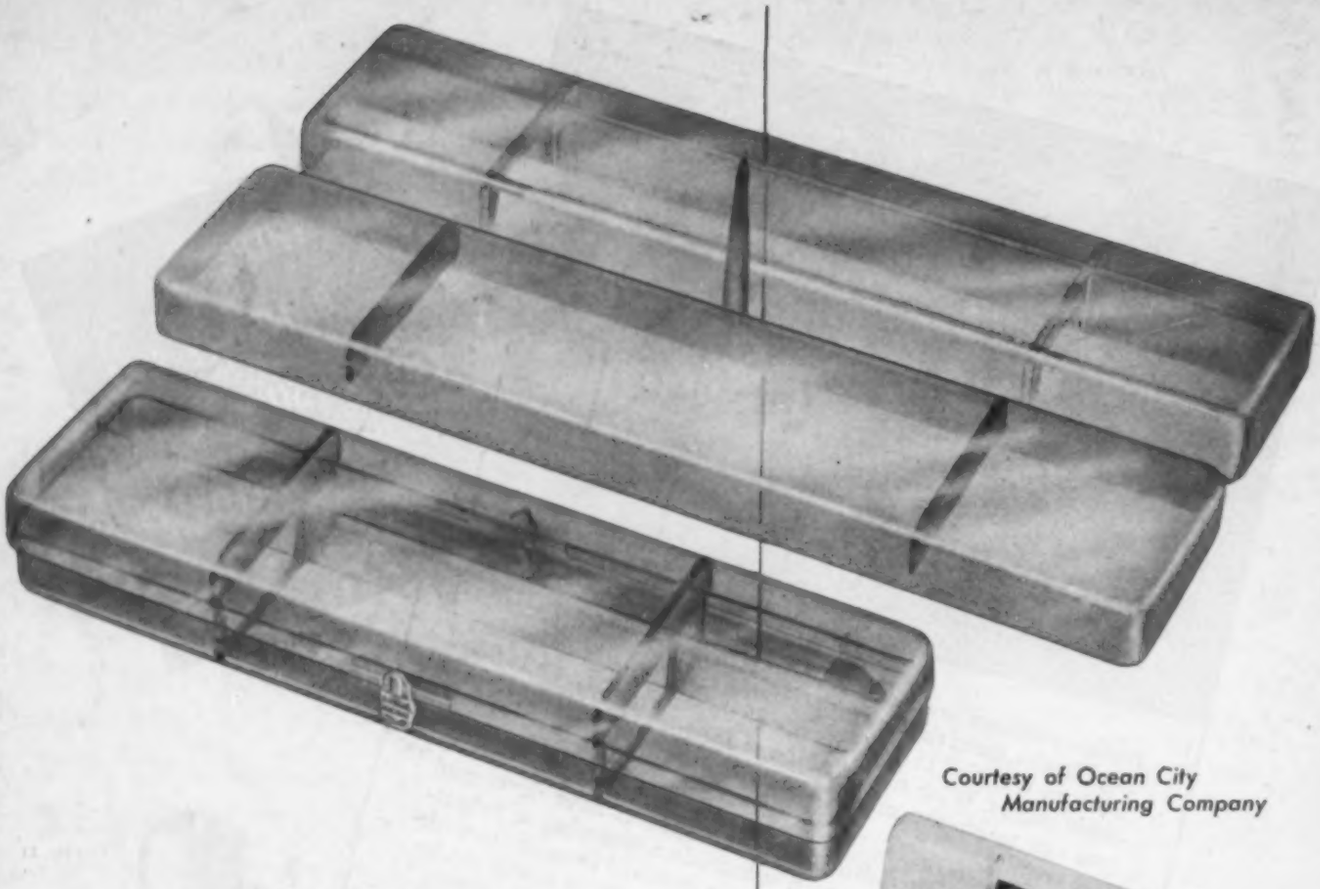
Please send me, without cost or obligation, a copy of your new bulletin No. 188 "FARREL-BIRMINGHAM PROCESSING MACHINERY."

Name..... Title.....

Company .....

Address .....

City..... State.....



Courtesy of Ocean City Manufacturing Company

A whale OF A MOULDING THAT DIDN'T get away

Frequently an injection moulding job encounters engineering difficulties or lack of proper facilities, and then "gets away" because of the huge size of the moulding itself. However, our moulding of Ocean City's tackle boxes is a fishing and a plastic story with the opposite kind of an ending. We "landed" the tops and bottoms of two Ocean City boxes successfully — one 4½ inches wide by 1⅜ deep by 16 inches in length and the other 20 inches long, weighing almost two pounds. Credit for overcoming a decided number of difficulties, to the complete satisfaction of the customer, can be shared equally by our designing and die making engineers, and by our skilled moulders and finishers. These advantages, which belong wholly to our clients, have saved many a new customer the trouble of fishing around for a solution to a plastic problem. We're anxious to have you make use of them.

Custom Injection Moulding

WORCESTER MOULDED PLASTICS CO.

14 HYGEIA STREET, WORCESTER 8, MASS.

17 East 42nd St., New York 17, N. Y.

130 West Chippewa St., Buffalo 2, N. Y.

New Way to Captivate A Television Audience!

Admiral Corporation has captivated its audience . . . the consumer market . . . with this table model television set of sales winning beauty and superior styling. Its cabinet is produced from BAKELITE Phenolic Plastics on a low-cost, fast production basis. But engineers and designers will be especially impressed by these production features . . .

The cabinet front, sides, top, and bottom are *molded in one piece* . . . with a deep draw of 16¾" . . . with decorative beading, dial recesses, picture-tube opening, inner mounting lugs and brackets all formed simultaneously!

It's a television innovation that has speeded up production, cut cabinet costs and—you can take it from Admiral—boosted sales! The clean lines, warm color, and handsome embellishments made possible with correct design and the right plastic are powerful sales advantages. And the excellent insulating properties of BAKELITE Phenolic Plastics make it possible to incorporate electrical and mechanical functions in a one-piece structure.

If you have a product on the drawing board that could use a plastic cabinet or other plastic parts, large or small, why not submit sketches and plans to Bakelite Corporation engineers for confidential analysis on the proper selection and application of the right BAKELITE Phenolic Plastic for the job. Write Department 20.

Bakelite TRADE-MARK *Phenolic* PLASTICS

BAKELITE CORPORATION

MOLDED BY MOLDED PRODUCTS CORPORATION.

BAKELITE CORPORATION, *Unit of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street New York 17, N. Y.

● ENGINEERED IN PLASTICS BY GENERAL ELECTRIC

Plastics help SPUR sales

● Plastics serve the drinks! This handsome Spur syrup dispenser is made for Canada Dry by General Electric. It incorporates eight plastics parts, and its attractive housing is injection molded of polystyrene.

Here is an excellent example of how General Electric's *complete* plastics service can work for a customer —for *you*. Design changes recommended by G. E. materially improved both the performance and the appearance of the Spur dispenser. And a careful selection of materials made certain that each part would be molded of the right type of plastics best suited to give smooth performance.

General Electric has facilities for designing, engineering, and molding *any* plastics job. For more information on how this valuable service can help solve *your* plastics problems, contact your nearest G-E sales office. Or write to Plastics Division, Chemical Department, General Electric Co., 1 Plastics Avenue, Pittsfield, Mass.

G-E COMPLETE SERVICE— AT NO. 1 PLASTICS AVENUE

Backed by 54 years of experience. We've been designing and manufacturing plastics products since 1894. General Electric research facilities have expanded continually, working to develop new materials, new processes, new applications for plastics parts.

No. 1 Plastics Avenue—complete plastics service—engineering, design, mold-making. G-E industrial designers work with our engineers to create plastics parts, sound and good looking. Skilled mold-makers in G-E toolrooms average over 13 years experience.

All types of plastics. Compression, injection, extrusion, transfer and cold mold facilities...high and low pressure laminating . . . fabricating. G-E Quality Control—a byword in industry, means as many as 160 inspections for a single plastics part.

EVERYTHING IN *Plastics*

You can put your confidence in

GENERAL ELECTRIC

General Electric plastics factories are located in Meriden, Conn., Coshocton, Ohio, Decatur, Ill., Taunton and Pittsfield, Mass.